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The purpose of this cross-sectional study was to examine the association between mammogram adherence in Filipino American women and 3 factors: need, enabling and predisposing. These factors were represented by 10 independent variables: breast cancer literacy, number of mammogram referrals by a healthcare provider, health insurance, sociocultural deterrents, fatalism, symptomatic deterrents, catastrophic disease expectations, negative health beliefs about healthcare professionals, nativity and years of residence in the United States. These variables corresponded with the need, enabling and predisposing factors in Andersen's Behavioral Health Model for the Utilization of Services which served as the conceptual framework of this study. The expanded version of Andersen's model, which contained need, enabling and predisposing factors unique to vulnerable population groups, was used.

The convenience sample consisted of 157 Filipino American women, who were at least 40 years old, residing in the United States and had never been diagnosed with breast cancer or breast disease. The sample was highly educated with 33.8% of whom had postgraduate credits or a post-graduate degree, 59.9% had a college degree and only 4 women (2.5%) had less than a college degree. Not surprisingly, all but 3 women had health insurance. Many of these Filipino American women lived in a household where there were at least two incomes (n=117, 74.5%), a few (n=28, 17.8%) lived in one-income households and only 6 (3.8%) lived in a household where there was no income-earner declared. Five Filipino American women were born in the United States, the rest

of the women (n=148, 94.3%) were born in the Philippines. The average time of residence in the United States was 25.09 (±11.18) years.

Logistic regression models were analyzed to determine the association between the study variables and mammogram adherence. Model 1 pertained to the need factor in Andersen's Behavioral Health Model. The need factor consisted of 2 variables: breast cancer literacy and the number of mammogram referrals by a healthcare provider. Model 2 pertained to the enabling factor in Andersen's Behavioral Health Model. The enabling factor consisted of 2 variables: health insurance and sociocultural deterrents. Model 3 corresponded to the predisposing factor in Andersen's Behavioral Health Model. The predisposing factor consisted of 6 variables: fatalism, symptomatic deterrents, catastrophic disease expectations, negative health beliefs about healthcare professionals, nativity and years of residence in the United States. Two of these variables – nativity and health insurance – were eventually deleted after analysis showed that they violated the assumption of cell frequency.

Of the variables in the logistic regression models, only 1 was significantly associated with mammogram adherence - the number of mammogram referrals by a healthcare provider. In Model 4, the odds of a Filipino American woman being mammogram adherent vs. being non-adherent were 113% higher with an AOR of 2.13 (95% CI, 1.094, 4.160; *p*-value=.026) for each additional mammogram referral from a healthcare provider, controlling for other variables in the model.

Breast cancer is one of the most commonly diagnosed cancers among Filipino American women. Breast cancer disparities in Filipino American women exist in terms of

mortality, age at diagnosis, tumor characteristics, delay in diagnostic follow-up and suboptimal treatment modalities. Mammogram is a proven technology to detect breast cancer early when it is most treatable and help alleviate some of these disparities. However, Filipino American women have had historically low mammogram adherence rates. What this study validated is that a referral from a healthcare professional is most determinative of mammogram adherence. This study provides a basis for health policy to be directed towards encouraging, monitoring and incentivizing healthcare professions to promote cancer screening.

BREAST CANCER LITERACY AND CULTURAL FACTORS INFLUENCING MAMMOGRAM ADHERENCE AMONG FILIPINO AMERICAN WOMEN

by

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CHAPTER I

INTRODUCTION

Background of the Problem

Breast cancer remains a significant health problem around the world and in the United States. In 2012, it was estimated that there were 1.68 million new cases of breast cancer and 0.52 million deaths globally (International Agency for Research on Cancer, 2016). Regardless of race, breast cancer is the most common cancer among women in the United States (Division of Cancer Prevention and Control, 2017). In 2017, it was estimated that >250,000 women were diagnosed with breast cancer and it claimed the lives of >40,000 in the United States (National Cancer Institute, 2017).

Over the period of 2009-2013, breast cancer incidence has been stable across all races with an average 0.1% decrease except for Asian and Pacific Island women with an increase of 1.4% (State Cancer Profiles, n.d.). In Filipino American women, there has been a significant annual increase in breast cancer incidence (Gomez et al., 2013). The incidence of breast cancer in Filipino American women was 85.8 per 100,000 women (1990-1994) but over the next decades, incidence increased to 103.7 (2004-2008) (Simpson, Briggs & George, 2015). While this rate is low compared to non-Hispanic White or African American women, it has been shown that the incidence of breast cancer in immigrants increases and approaches or may even exceed that of U.S.-born women the

longer immigrants reside in the United States (Simpson, Briggs & George, 2015; Gomez, et al., 2010b). Mammogram, which is an x-ray of the breast, can detect invasive breast carcinoma as small as 1.7 millimeters in diameter (International Agency for Research on Cancer, 2016). The alternative to a screening mammogram is to wait until the cells would have doubled multiple times to where the tumor becomes palpable. A tumor is assumed to be clinically palpable when it reaches 2 centimeters in diameter (Kopans et al., 2003).

There are 3 distinct benefits to early detection via screening mammograms: lower breast cancer mortality, life years (LY) gained and lower treatment costs related to breast cancer diagnosis. Mammogram makes it possible to detect a cancer at a lower stage when prognosis is best. The potential of early diagnosis through mammography translates into a 5-year survival advantage with rates as high as 98.9% for localized disease, which dramatically drops to 26.9% with distant metastasis (Division of Cancer Prevention and Control, 2017). The benefit of a screening mammogram can also be appreciated through life years gained. Life years (LY) is a health economics index that takes into account life expectancy (Robberstad, 2005). In other words, the difference lies between saving the life a 40-year old with breast cancer and the life of a 60-year with breast cancer. Without mammography screening, life years lost from breast cancer would be 360.1 years per 1,000 women (Yaffe, et al., 2015). This translates into 19.1 life years lost for a woman who is diagnosed with breast cancer after age 40.

One way that expensive treatment for advanced or late-stage breast cancer could be averted is through screening mammogram. Early diagnosis through mammography screening downstages the tumor which translates into lower treatment costs. Average per

capita cost to treat breast cancer is higher for patients whose breast cancer is more advanced at diagnosis. The biggest increment is from Stage I/II and Stage III where the average treatment cost jumps from $82,121 to $129,387. Indeed, mammography screening translates not only to lives saved but to healthcare cost savings (Gai & Feng, 2013).

Screening mammography is not a perfect tool. One major drawback to screening mammography is overdiagnosis. Overdiagnosis is a breast cancer diagnosis that would not have been otherwise diagnosed and treated but for a mammography screening (Duffy, et al., 2010). However, in weighing the benefit of screening against the harm of overdiagnosis, it was estimated that the benefit of mammography screening in terms of numbers of deaths averted were about double the harm of overdiagnosis (Duffy, et al., 2010). Related to overdiagnosis are false-positives and costs associated with a diagnostic follow-up. Costs of overdiagnosis and false-positive aside, the cost of the screening mammogram is a major consideration. Even though a mammogram may not be expensive or may even be at no-cost to the age-eligible woman, a national screening program - such as that supported by the Affordable Care Act - comes at a high financial cost to the government. According to one estimate, the annual cost in 2010 would have been in the range of $7.8 billion (O'Donoghue, Eklund, Ozanne & Esserman, 2014). One way to contain the cost would be biennial screening of women between the ages of 50-70, this would generate a savings between $5.4 and $7.7 billion. Also, extending the biennial screening to 40-49 age group is cost-effective (Stout, et al., 2014).

Even with biennial screening for women ages 50-74, this will amount to 116.3 life years (LY) saved per 1000 women. Despite the benefits of LYs gained and decreasing breast cancer mortality that screening mammography offers, the percentage of women aged 40 and above who had a mammogram within the past 2 years remains at 65.3% (National Center for Health Statistics, 2017). This is about 16 percentage points below the Healthy People 2020 target of 81.1%. Across racial groups, Asian women have the lowest mammogram adherence rate [62.7%], compared to Hispanic [62.8%], White (68.2%) and Black women [72.3%] (National Center for Health Statistics, 2017). Adherence to regular mammogram screening is especially problematic among recent immigrants. Only 46.6% of immigrants who had been in the United States less than 10 years reported having had a mammogram within the past 2 years (Centers for Disease Prevention and Control, 2012). These low rates of mammogram use among immigrants increases the risk for a late-stage presentation of the disease (Oh, Taylor, & Jacobsen, 2017; Lee et al., 2016).

The latest data from the National Health Interview Survey (NHIS) report that Filipino women were the only ethnic group that met the Healthy People 2020 goal (81.1%) at 81.5% (White, et al., 2017). Considering the sample size and confidence interval (n=88; 95% CI, 67.5-90.4) of this study and that adherence rates vary from year to year and from survey to survey, this information needs to be interpreted with caution especially since the Centers for Disease Control and Prevention (2012) reported that Filipino immigrant women had a mammogram screening rate of 62.1%, the lowest across all races. In a more recent study, Filipino American women were again found to have the

lowest uptake of mammograms at 67.7% across all races (Sabatino, White, Thompson & Klabunde, 2015). In another study, it was reported that mammogram use increased significantly for Asian women in the period from 2010-2013 but decreased significantly for Filipino women in the period from 2008-2010 (Shoemaker & White, 2016). In the light of historically low mammogram adherence rates in Filipino women, and to achieve the Healthy People 2020 benchmark of 81.1%, barriers and facilitators to mammography use in this understudied population group need to be examined.

Compared to Non-Hispanic White and Black women with breast cancer incidence of 128.1 per 100,000 and 124.3 per 100,000 women, respectively, Asian / Pacific Islander women have a relatively low incidence of breast cancer with only 88.3 per 100,000 women (Siegel, Miller & Jemal, 2016). Across five races, Asian women have the second to the lowest incidence of breast cancer and they have one of the lowest breast cancer mortality rates, second only to Native American or Alaskan Native women (Centers for Disease Prevention and Control, 2016). One could argue that no cancer disparity exists in Asian women. However, mortality rates in the Asian population should be interpreted with caution.

There is an overestimation of survival advantage (or underestimation of mortality) in certain ethnic groups related to three methodological issues. The first reason why the breast cancer survival advantage of Asian women should be interpreted with caution has to do with how data are aggregated. Asian Americans, the fastest growing population in the United States, are a distinct group of different ethnicities and have marked differences in health behaviors and health outcomes (Thompson et al., 2016). The practice of

aggregating heterogeneous ethnic groups into one race (e.g. Filipinos with Asians) in estimating cancer prevalence or mortality hides significant variations within the ethnic group (Gomez, et al., 2013) and the group with the highest risk for late-stage cancer is obscured (Kagawa-Singer & Pourat, 2000). For example, using the 2004-2008 Surveillance, Epidemiology and End Results (SEER) data, Kampuchean women have a breast cancer death rate of 26.7 per 100,000 [95% CI, 19.0, 36.3], compared to more than three times the rate of Filipino women at 103.7 per 100,000 women [95% CI, 100.7, 106.7] (Gomez, et al., 2013). Thus, the purpose of this study is to examine the variables that influence mammogram adherence rates among Filipino American women as a group disaggregated from Asian women.

The second reason why low breast cancer mortality rates among Asian women should be interpreted with caution is the so-called salmon effect. The mortality rate among immigrants may be underestimated because immigrants return to their native countries to die - the "salmon effect" (Gomez, et al., 2010a). The salmon effect is just one explanation to the larger phenomenon of the so-called healthy immigrant effect. The other reason why immigrants appear to be healthier than native born Americans is through self-selection. People who migrate to the United States are typically better educated and healthier (Kennedy, Kidd, McDonald & Biddle, 2015). The prevalence of chronic conditions reported by South Asian immigrants is less compared to their US-born counterparts (-.13), so is the prevalence of obesity (-.22) and history of smoking (-.28) at the 5% level of significance (Kennedy, Kidd, McDonald & Biddle, 2015).

The third methodological problem has to do with misclassification of race. The National Center for Health Statistics (2016) explicitly states:

> Death rates for Hispanic, American Indian or Alaska Native, and Asian or Pacific Islander persons should be interpreted with caution because of inconsistencies in reporting Hispanic origin or race on the death certificate (death rate numerators) compared with population figures (death rate denominators). The net effect of misclassification is an underestimation of deaths and death rates for races other than White and Black (p. 131).

It has been estimated that 4.2% of deaths are missed in Filipino-Americans related to missing social security numbers and inaccurate classification of race (Pinheiro, Morris, Liu, Bungum & Altekruse, 2014).

Significance

In 2013, Filipinos were the fourth largest immigrant population group in the United States, accounting for 4.5% of the total immigrant population (McNamara & Batalova, 2015). The median age for Filipino immigrants was 49 years old (McNamara & Batalova, 2015). Among Filipino-Americans, 59% are foreign born, 28% of these have been in the United States for <10 years; still, 82% of Filipinos are proficient in English (Pew Research Center, 2017).

Relative to U.S.-born and other immigrants, Filipinos have a high socioeconomic level. Foreign-born Filipinos are highly educated; 9% of whom have a post-graduate degree. Forty percent of Filipino immigrants have a bachelor's degree compared to U.S.-born Filipinos (30%), all Asians (30%) or all Americans (19%). The median income of all Filipinos in the U.S. ($80,000) is higher than all other Asian immigrants ($73,000).

Only 7.5% of Filipinos live at or below the poverty level compared to 15.1% of all Americans (Pew Research Center, 2017).

Given the high socioeconomic status of Filipinos in America, there is an incongruence with preventive cancer screening rates. The economic and educational advantage of this ethnic group does not necessarily or consistently translate to higher mammogram adherence rates for Filipino American women. If we are to achieve the Healthy People 2020 goal that 81.1% of age-eligible women should have had a mammogram within the past 2 years, this study becomes important in identifying barriers that deter Filipino American women from having a screening mammogram. Taking into consideration that few studies have been conducted on Filipino American women as a disaggregated group, this research is timely.

Even though Filipino women do not have the highest incidence of breast cancer among Asian Americans, they are more likely to die of breast cancer (Ho, Muraoka, Cuaresma, Guerrero & Agbayani, 2010). This mortality rate may be related to the breast cancer disparity that is associated with Filipino American women in terms of younger age at diagnosis, later stage at diagnosis and worse tumor characteristics (tumor grade, hormone receptor and Her2-neu status). One of these factors - later stage at diagnosis - may be attributable to low rates of mammogram adherence among Filipino American women (Ho, Muraoka, Cuaresmo, Guerrero & Agbayani, 2010).

Filipino American women are being diagnosed at a statistically significant younger age (53.2) compared to Asians (55.1) or non-Hispanic White women (58.4) (Gomez, et al., 2010b; Simpson, Briggs & George, 2015). The age at diagnosis is an

important prognostic factor of breast cancer mortality. The younger the woman at the time of diagnosis, the more likely that the breast cancer is an aggressive type, and therefore the worse off in terms of survival and recurrence of breast cancer (Assi et al., 2013). Regardless of hormonal receptor status, Filipino women are being diagnosed at an earlier age (Chu, Anderson, Fritz, Ries & Brawley, 2001). Table 1 shows the major peak in age distribution across hormonal status among different ethnicities.

Table 1

Breast Cancer Distribution by Peak Age, Race and Hormonal Status (SEER data, 1992-1997, n=112,588)

	ER+PR+	ER+PR-	ER-PR+	ER-PR-
White	71, 50	70, 54	48	50
Black	71, 48	66	51	47
Hispanics	46, 65	68	43	47
Japanese	66	67	61	65
Filipino	**48**	**56**	**48**	**46**
Chinese	47, 68	57	45	47
Native Hawaiians	67, 52	60	37	64
American Indians/Alaska Natives	46	59	NR	53

ER, estrogen receptor:; PR, progesterone receptor; NR, not reported, <10 tumors
Source: Chu, Anderson, Fritz, Ries & Brawley, (2001)

Tumor staging in breast cancer goes by the TNM system where T stands for tumor size, N stands for node involvement and M stands for metastasis. A higher-stage diagnosis has a strong association with higher mortality rates (Ho, Muraoka, Cuaresma, Guerrero & Agbayani, 2010). US-born women were more likely than immigrant women to be diagnosed with localized disease (Gomez, et al., 2010a). Regardless of hormonal

status, Filipino women had higher percentages of Stage II tumors than Stage 1 compared to White or Japanese women (Chu, Anderson, Fritz, Ries & Brawley, 2001). Table 2 summarizes distribution by stage by race.

Table 2

Breast Cancer Distribution by Stage and Hormonal Status among Asian Women (SEER data, 1992-1997, n=112,588)

	ER+PR+		ER+PR-		ER-PR+		ER-PR-	
White	I	52%	I	47%	I	42%	I	35%
	II	37%	II	38%	II	41%	II	46%
Japanese	I	60%	I	57%	I	51%	I	44%
	II	32%	II	33%	II	37%	II	40
Filipino	I	46%	I	43%	I	28%	I	28%
	II	42%	II	40%	II	54%	II	55%

ER, estrogen receptor; PR, progesterone receptor; NR, not reported, <10 tumors; I, Stage 1; II, Stage 2
Source: Chu, Anderson, Fritz, Ries, & Brawley, (2001)

Whereas breast cancer stage refers to tumor size, tumor grade refers to the aggressiveness of the tumor. Breast cancer with a higher grade translates into a tumor whose cells multiply more rapidly. Compared to Chinese (33.5%) and Japanese women (27.8%), Filipino (53.5%) and Korean (63.2%) women had a higher percentage of Grade 3 tumors (Chuang, et al., 2012). Breast cancer subtypes are categorized by estrogen receptor status with estrogen receptor negative (ER-) being less responsive to treatment and having poorer survival than ER+ tumors. While Black women had the highest percentage of ER- tumors (39.9%), Filipino women were found to have a higher

percentage ER-negative tumors (28.2%) compared to Japanese (21.9%), Chinese (27.7%) or White (23.4%) women (Chu, Anderson, Fritz, Ries & Brawley, 2001).

The expression of the *Her2-neu* gene signifies a breast cancer subtype that is highly aggressive. In a sample of women across 8 racial groups (n=8,140 Asian women; n=89,000 total), immigrant women were found to have increased frequencies of *Her2-neu* subtypes with Filipino women having the least favorable frequency (Telli, et al., 2011). Forty-six percent of Filipino-American women with breast cancer overexpressed the *Her2-neu* gene, as compared to only 19% of non-Hispanic White women. Compared to their Asian counterparts (Chinese 24.9%, Japanese 13.9%, Korean 29.4%), Filipino women had a higher proportion of Her2-neu overexpression at 45.6% (Chuang et al., 2012). Not only does this gene carry an aggressive clinical course, Her2-neu cancers are associated with much higher costs than other breast cancer subtypes (Telli, et al., 2011).

Breast cancer disparity in Filipino American women includes suboptimal cancer care such as failure or delay in diagnostic evaluation following abnormal results of a screening mammogram. Asian women were found to have a higher rate of having no follow-up at 30 days compared with non-Hispanic White women (77% vs. 57%, $p<.0001$). Among Asian women, Filipinas were found to have the highest percentage of women without any follow up (18.1%) following an abnormal mammogram (Nguyen, Pasick, Stewart, Kerlikowske, & Karliner, 2017). Compared to non-Hispanic white women, Vietnamese and Filipino women had the longest median follow-up after an abnormal mammogram (15, 30, and 28 days, respectively). Also, with respect to cancer care post-diagnosis, Filipino women were (OR=0.46, 95% CI, .33-.66) least likely as to

undergo breast conservation surgery (White women, OR=1.0; Japanese, OR=0.62; Chinese OR=0.74 and Hawaiian OR=0.81). And, Filipino women (OR=0.80, 0.42-1.49, 95% CI) were still least likely to receive radiation after breast conservation surgery compared to White (OR=1.0;), Japanese (OR=1.38; 0.86-2.23, 95% CI), Chinese (OR=2.33;0.96-5.64 95% CI) or Hawaiian women (OR=1.23; 0.68-2.23, 95% CI) (Gelber, McCarthy, Davis & Seto, 2006).

Considering the breast cancer disparities in Filipino American women in terms of younger age at diagnosis, late stage diagnosis and tumor characteristics, and historically low mammogram adherence rates, Filipino American women should be more vigilant about adherence to mammogram screening recommendations. This research will examine mammogram adherence among Filipino American women. Therefore, the purpose of this study is to examine whether there is an association between mammogram adherence and predisposing, enabling and need factors among Filipino American women. An adaptation of Andersen's Behavioral Health Model of Services for Vulnerable Populations will be used to guide the study (Figure 1).

Conceptual Framework

Andersen's original model - the Andersen's Behavioral Health Model for the Utilization of Services - was designed to explain the factors for the utilization of health services with predisposing, enabling and need factors as precursors to health outcomes. In the expanded version of Andersen's Behavioral Health Model, the vulnerable population domain was added by Gelberg, Andersen and Leake (2000) to "refocus our attention to the health needs of our vulnerable populations who are at a higher risk for disease and

injury" (p. 1274). The expanded Andersen's Behavioral Health Model for the Utilization of Services for Vulnerable Populations will be used in this study wherein independent variables fall under one of these factors: need-traditional, need-vulnerable, enabling-traditional, enabling-vulnerable, predisposing-traditional and predisposing-vulnerable. While the research focus of Gelberg, Andersen and Leake's study that launched the expanded Andersen's Behavioral model was the homeless population, immigrants, especially recent immigrants and other minorities, are decidedly vulnerable populations.

Figure 1 shows an adaptation of Andersen's Behavioral Health Model of Service for Vulnerable Populations with the variables of interest in this study. According to Andersen's model, 3 factors determine a desired health behavior, in this case, mammogram adherence. In this model, the most immediate factor for the desired health behavior (mammogram) is *need*. A woman develops a realization that she needs to go for a mammogram. According to this model, need is the proximate cause for mammogram adherence. *Enabling factors* directly influence need and also influence mammogram adherence. Least influential and furthest from mammogram adherence are the *predisposing factors*.

Figure 1

Andersen's Behavioral Health Model of Utilization of Services for Vulnerable Populations as Adapted by Astrid Oviedo

Predisposing ⟶	**Enabling** ⟶	**Need** ⟶	**Health Behavior**
Traditional Domain	*Traditional Domain*	*Traditional Domain*	
Beliefs about breast cancer Attitudes towards health services	Insurance status	Breast cancer literacy	Mammogram Adherence Most recent mammogram ≤2 years
Vulnerable Domain	*Vulnerable Domain*	*Vulnerable Domain*	
Nativity Years of U.S. residence	Competing needs Navigation issues	Mammogram referral by a healthcare professional	

Reference: Gelberg, Andersen and Leake, 2000

Andersen's Behavioral Health Model of Services has been used in several studies to examine factors associated with screening for cervical cancer (e.g. Lee, Yang, Lee & Ghebre, 2015), colorectal cancer (e.g. Lee, Lundquist, Ju, Luo & Townsend, 2011) and breast cancer screening (Leong-Wu & Fernandez, 2006; LaHousse, 2010 [Doctoral Dissertation]); Ivanov, Hu and Leak, 2010; Miller & Champion, 1996). Table 1 summarizes a list of breast cancer screening studies that used Andersen's model and how the *predisposing*, *enabling* and *need* factors were operationalized in these studies.

Some mammogram studies that utilized the basic version of the Andersen's Behavioral model included variables unique to a vulnerable population group foremost of

which are nativity and years of residence. Leong-Wu and Fernandez (2006) in investigating mammogram adherence among Filipino American women included nativity and years of U.S. residence as independent predisposing variables. Ivanov, Hu and Leak (2010) evaluated the association of acculturation and length of residence with mammogram adherence among Russian immigrant women. Lee, Lee, Jang and Lee (2017) in studying mammogram adherence among Korean American immigrant women included distrust of professionals as an independent variable. While these studies examined some aspects of the vulnerable domain - e.g. distrust of healthcare professionals, length of U.S. residence and acculturation - this current study is more comprehensive. This study will have vulnerable domain variables in all 3 factors: predisposing, enabling and need - thus completing the whole model.

Table 3

Mammogram Studies that Utilized Andersen's Behavioral Health Model for the Utilization of Health Services

	Predisposing	**Enabling**	**Need**
Ivanov, Hu & Leak (2010)	Age, months in the US, acculturation	Insurance	None
Leong-Wu & Fernandez (2006)	Age, education, place of birth, years of residence in the U.S.	Insurance, income	Family history of breast cancer
Rahman, Dignan & Shelton (2005)	Age, race, education	Insurance, community economic status (median income per zip code)	Family history of breast cancer, current breast problems, hormone replacement therapy, follow-up test recommendations
Gorin & Heck (2005)	Age, nativity, race, education, marital status, acculturation, smoking status, personal/family history of cancer, perceived risk of cancer	Insurance, income, healthcare visit in the past 12 months	Self-rated health status, used at least one other cancer screening test
Champion, Skinner, Miller, Goulet & Wagler (1997)	Attitudes (perceived susceptibility, benefits and barriers related to mammography)	Insurance, income, regular source of healthcare, willingness to pay for mammography	Mammogram referral was listed as a variable but this was not categorized explicitly as a need variable

Table 3 – continued

	Predisposing	Enabling	Need
Miller & Champion (1996)	Age, education, attitudes (perceived susceptibility, benefits, barriers, and social influence of significant others on obtaining mammograms), knowledge, intent to have a mammogram; history of Pap smear tests	Insurance, income, willingness to co-pay $50 for a mammogram and having a healthcare provider.	Referral for a mammogram by a physician and consumer initiated request for a mammogram.

Need. According to the model, *need* is the stimulus or the most direct reason for getting a mammogram or other health behavior (Andersen, Kravits & Anderson, 1975). A woman must perceive the need for a mammogram. In mammogram studies using Andersen's model, *need* was operationalized with family history of breast cancer (Leong-Wu and Fernandez, 2006; Rahman, Dignan & Shelton, 2005), current breast problems (Rahman, Dignan & Shelton, 2005), use of hormone replacement therapy (Rahman, Dignan & Shelton, 2005), self-rated health status (Gorin & Heck, 2005), use of one other cancer screening test (Gorin & Heck, 2005) and referral for a mammogram (Champion, Skinner, Miller, Goulet & Wagler, 1997; Miller & Champion, 1996) or follow-up test recommendation (Rahman, Dignan & Shelton, 2005). At a bare minimum, a woman must know that mammography is a screening tool for breast cancer and she must know the guidelines pertaining to screening mammograms in terms of age of initiation and

frequency. Thus, breast cancer literacy spells the need factor in the model for mammogram adherence.

Need, vulnerable domain. The model differentiates between the types of health services that are utilized: preventive versus illness-related, or custodial (Aday and Andersen, 1974). Need for illness-related care would be the presentation or severity of symptoms, whereas need for preventive care such as cancer screening has not been defined or described in detail in the literature. Need could be determined by knowledge screening guidelines (health literacy) or a provider's referral for a screening. In the Philippines, there is no government-issued screening guideline for mammography screening. So recent Filipino immigrant women may not even be aware that guidelines exist. Thus, recommendation from a provider may be the one way that Filipino women learn about getting regular mammograms. There is literature that supports that the strongest predictor of cancer screening among Filipino American women is a recommendation from a healthcare provider (Maxwell, Bastani & Warda, 1997), but there is lack of recent literature that confirms this.

Enabling. A woman may be predisposed to have a screening mammogram, but she must have the means to do so (Andersen, Kravits & Anderson, 1975). The enabling factor has been investigated in many breast cancer screening studies that used Andersen's Behavioral Model as the conceptual framework. The enabling factor has been operationalized using income or economic status (Leong-Wu & Fernandez, 2006; Rahman, Dignan & Shelton, 2005; Champion, Skinner, Miller, Goulet & Wagler, 1997), willingness to pay out-of-pocket costs (Champion, Skinner, Miller, Goulet & Wagler,

1997), health insurance status (Ivanov, Hu & Leak, 2010; Leong-Wu & Fernandez, 2006; Rahman, Dignan & Shelton, 2005, Gorin & Heck, 2005 and Champion, Skinner, Miller, Goulet & Wagler, 1997) and healthcare-provider related factors such as having a regular source of care and number of visits to the regular source of health care (Gorin & Heck, 2005 and Champion, Skinner, Miller, Goulet & Wagler, 1997).

Enabling, vulnerable domain. Being isolated from mainstream America, social isolation exacerbates the vulnerable population's ability to obtain health services (Gelberg, Andersen, & Leake, 2000). Thus, enabling factors in the vulnerable domain include personal and family resources or constraints such as competing needs, ability to negotiate the system, and transportation. Competing needs adversely affect preventive care in the vulnerable population (Gelberg, Andersen & Leake, 2000). Competing needs are less important in case of severe illness. But in preventive care services, e.g. screening mammography, competing needs are important to address for policy implications. Competing needs lead to neglect of preventive care and if breast cancer develops and progresses, this comes at a greater cost to society and less quality of life or even death to the individual (Stein, Andersen & Gelber, 2007). These enabling factors in in Filipino American women as a vulnerable population are important to investigate because they are at a higher risk for breast cancer incidence and mortality**.** Unique challenges in accessing healthcare services faced by this vulnerable group will determine policy guidelines and help design culturally concordant interventions.

Predisposing. Predisposing factors are those variables that lend the individual to have a propensity to use a health service (Andersen, Kravits & Anderson, 1975). This

propensity exists prior to the onset of illness and includes demographics such as ethnicity, education and attitudes. In mammogram studies which used Andersen's Behavioral Health Model as a conceptual framework, the *predisposing* factor was operationalized largely in terms of either demographics, health beliefs, attitudes or variables related to some aspect of culture.

Several predisposing demographic characteristics have been evaluated in previous studies: age (Ivanov, Hu & Leak, 2010; Leong-Wu & Fernandez, 2006; Rahman, Dignan & Shelton, 2005); race (Leong-Wu & Fernandez, 2006; Rahman, Dignan & Shelton, 2005, Gorin & Heck, 2005); marital status (Gorin & Heck, 2005), and educational level (Leong-Wu & Fernandez, 2006; Rahman, Dignan & Shelton, 2005; Gorin & Heck, 2005) Also, cultural aspects have been examined: nativity (Leong-Wu & Fernandez, 2006), length of residence in the U.S. (Ivanov, Hu & Leak, 2010; Leong-Wu & Fernandez, 2006), acculturation (Ivanov, Hu & Leak, 2010; Gorin & Heck, 2005). Other studies have categorized attitudes and knowledge as predisposing factors: attitudes (Champion, Skinner, Miller, Goulet & Wagler, 1997; Miller & Champion, 1996) and knowledge (Miller & Champion, 1996)

Predisposing, vulnerable domain. Everyone has a unique propensity to use health services. An individual's trait may not be the direct reason for seeking health services but the differences in these characteristics result in differences in people's inclination to utilize health services (Andersen & Newman, 2005). In the vulnerable population, predisposing factors include acculturation, country of birth or immigration status, and residential history (Gelberg, Andersen & Leake, 2000)

Purpose

The purpose of this study is to determine what need, enabling and predisposing factors are associated with mammogram adherence in Filipino American women. This study considers nativity, years of residence in the United States, health insurance status, and mammogram referrals but emphasizes the investigation of breast cancer literacy and cultural factors as barriers to mammogram adherence in Filipino American women. The research questions are:

Research Question 1. What need factors, if any, are associated with mammogram adherence in Filipino American women?

Research Question 2. What enabling factors, if any, are associated with mammogram adherence in Filipino American women?

Research Question 3. What predisposing factors, if any, are associated with mammogram adherence in Filipino American women?

Research Question 4. What need, enabling and predisposing factors, if any, are associated with mammogram adherence in Filipino American women?

Summary

Filipino American women may not have the highest breast cancer incidence, but they have one of the worst breast cancer mortality rates. This may due to the fact that Filipino American women are an ethnic group that experiences breast cancer disparity in terms of being diagnosed at a younger age, at a later stage and with tumors that have worse characteristics (higher grade at diagnosis, ER-negative and Her2-neu overexpression). Screening mammograms could be one way to narrow this disparity in

terms of improving breast cancer survival rates but Filipino American women have had historically low mammogram rates. The socioeconomic advantages of a typical Filipino household – e.g. higher income, education, and health insurance status - do not explain why Filipino American women have low mammogram use. This research seeks to investigate what need, enabling and predisposing factors, if any, are associated with mammogram adherence rate in Filipino American women using Andersen's Behavioral Health Model of Services for Vulnerable Populations.

CHAPTER II

REVIEW OF LITERATURE

Mammography was first endorsed by the American Cancer Society as a screening tool in the 1970's. Since then mammogram rates have improved over the years starting with 31.7% adherence rate in 1987 for women ages 50 to 64 years old to an all-time high of 78.7% in 2000; however, progress has since stalled. During the decade between 2003 and 2013, mammogram adherence in the 50 to 64 age group ranged from a high of 76.2% in 2003 to 71.4% in 2013 (Center for Disease Control and Prevention, 2014). According to Brown et al. (2014), mammogram rates have not improved during the past decade and health disparities in breast cancer screening persist.

Mammography Screening Guidelines

Two organizations that issue and regularly update breast cancer screening guidelines are the U.S. Preventive Services Task Force and the American Cancer Society. These two organizations differ in their mammography screening guidelines in two ways: the age at which to start screening and the intervals between screenings. It is important to note that these guidelines are applicable to women with an average risk of breast cancer, that is, a woman without the presence of other risk factors such as, for example, having a mutation of a breast cancer gene.

U.S. Preventive Services Task Force. The U.S. Preventive Services Task Force's recommendations form a basis upon which Medicaid determines preventive

cancer screening coverage for its clients (DeGroff, et al., 2014); thus, its recommendations carry great weight. The U.S. Preventive Services Task Force (USPSTF) divides women into 3 age groups: < 50 years old, between the ages of 50 and 74, and ≥ 75 years old. For women aged <50, the decision to start regular biennial screening is an individual one, taking into consideration patient's preferences regarding benefit and harm. For women between the ages of 50 and 74 years, the USPSTF recommends biennial screening. For this group of women, the USPSTF believes that there is "moderate certainty that the net benefit is moderate to substantial" (U.S. Preventive Services Task Force, 2014). For women 75 years or older, the U.S. Preventive Services Task Force concludes that the current evidence is insufficient to assess the balance between the harms and benefits of biennial mammography screening.

American Cancer Society. The American Cancer Society (ACS) recommends that women should begin having yearly mammograms by age 45 and, may change to having mammograms every other year beginning at age 55; nonetheless, 55-year old women or older should still have the option to have an annual mammogram. The ACS states that women should have the choice to start yearly mammograms at age 40.

Lives saved with initial screening at 40. During the past decade, there have been disagreements between the American Cancer Society and the U.S. Preventive Services Task Force on the age to initiate screening mammograms. Recently, the National Cancer Institute funded the Cancer Intervention and Surveillance Network (CISNET) to develop computer models factoring in screening guideline variants and simulating the population survival outcomes. A comparison was done among 3 screening guideline models: 1)

Model 1 (annual): yearly screening beginning 40 to 84 years, 2) Model 2 (hybrid): yearly screening from 45 to 54 years, and biennially from 55 to 79 years, and 3) Model 3 (biennial): screening every 2 years for women age 50 to 74 years. Mortality reduction was greatest with the recommendation of yearly screening starting at age 40 with 29,369 deaths averted compared to the hybrid recommendation (22,829) or biennial screening (17,153) (Arleo, Hendrick, Helvie & Sickles, 2017).

Affordable Care Act and screening mammograms. It is noteworthy that in its implementation of the Affordable Care Act, the U.S. Department of Health and Human Services uses the USPSTF's 2002 recommendation for screening mammogram – starting at age 40 and every 1 to 2 years - as benchmark for coverage. With the enactment of the Affordable Care Act, all health plans must cover mammogram screening without the woman having to co-pay and regardless of her deductible. What this translates into is that health insurance, rather than income to shoulder co-payments, may be associated with screening mammogram use.

Healthy People 2020 Goals on Breast Cancer

Healthy People is a program of the United States government that was initiated from a Surgeon General report in 1979. *Healthy People* formulates 10-year goals for the overall health of the American public. The *Healthy People 2020* goals on breast cancer are:

- Reduce the late-stage breast cancer from 44.3 to 42.1 per 100,000 females
- Reduce the female breast cancer death rate from 23.0 to 20.7 female breast cancer deaths per 100,000 females

The breast cancer death rates and late-stage diagnosis rates may be reduced through the *Healthy People 2020* goals on mammograms:

- Increase the proportion of women who were counseled by their providers about mammograms from 69.8% to 76.8%
- Increase the proportion of women aged 50 to74 who receive breast cancer screening based on the most recent guidelines from 73.7% to 81.1%

Mammography Screening Trends

Asians had the highest mammography rate in 2013 at 66.6% (Center for Disease Control and Prevention, 2014), but this is still way below the current *Healthy People* goal of 81.1%. According to the latest data from the National Health Interview Survey, Filipino women were the only ethnic group that met the Healthy People 2020 goal (White, et al., 2017). Considering the sample size and confidence interval (n=88; 95% CI, 67.5-90.4) and that adherence rates vary from year to year and from survey to survey, this improvement should be interpreted with caution. In previous years, and as recently as 5 years prior, Filipino women had the lowest rate of mammogram adherence at 62.1% among Asian women (Center for Disease Control and Prevention, 2012).

While mammogram rates are significantly lower for Filipino women and Asians in general, the rates are more dismal in the first-generation immigrant women sub-groups. Among immigrant women, aged 50 to 74 years, who had been in the United States for less than 10 years, only 46.6% reported having had a mammogram within the past two years. (Center for Disease Control and Prevention, 2012). Reaching out to this group of women with historically low mammogram uptakes is important to achieve the National

Cancer Institute's goal of closing in on cancer health disparity in vulnerable ethnic groups and to meet the *Healthy People 2020* goal of reducing breast cancer mortality rate.

Methodological Issues

Disaggregated cancer data on Asian American women are lacking (Martin, et al., 2016). In other words, much of the data on the Asian population are aggregated under the Asian-American Islander (AAPI) ethnic group (Wu, West, Chen & Hergert, 2006). Thus, breast cancer health statistics on Asian women - specifically those that report low breast cancer incidence or high survival rates - should not be generalized to Filipino American women without caution. Most of the available mammogram studies on Filipino American women are dated and so much is yet to be determined as to what factors are associated with screening in this population (Maxwell, Bastani & Warda, 2000). It is important to study this subgroup of women separately, that is, the Filipino American women as a disaggregated group.

Research shows that cancer incidence and preventive health behaviors have a wide variance among the Asian immigrant population (Ryu, Crespi & Maxwell, 2013). For example, having routine medical checkups had a significant association with mammogram screening in Filipino women but it was not so for Korean women (Maxwell, Bastani & Warda, 1998). Among those who reported ever having a checkup, Filipina women had much higher odds (AOR=2.96; 95% CI, 1.54-4.31, $p<.05$) of having had a mammogram within the past 2 years, whereas this association had no significance

for Korean women (Maxwell, Bastani & Warda, 2000). These variances underscore the importance of disaggregating studies and focusing on one ethnic group.

No data was found on the proportion of Filipino immigrant women who had had at least one mammogram in the Philippines. However, one study showed that 86% of newly-arrived refugee women in the U.S. who were eligible for a mammogram have *never* had a mammogram in their native country (Barnes & Harrison, 2004). Why immigrants and ethnic minorities have low adherence rates of mammogram screening is an important question to answer. In mammogram studies conducted with Asian, including Filipino women, cultural factors such as difficulty going to the mammogram facility are frequently cited as barriers (Maxwell, Bastani & Warda, 1997; Ko, Sadler, Ryujin, & Dong, 2003). However, none of these studies have comprehensively measured the cultural beliefs about cancer through items in a scale as this study was designed to do using the Cultural Cancer Screening Scale.

Need Factor: Breast Cancer Literacy

Previous mammogram research on Filipino American women has established the association between breast cancer literacy and mammogram adherence. In one mammogram study done on Filipino women as a disaggregated group, breast cancer knowledge was recognized as "a necessary precursor to women's adherence to breast cancer screening guidelines" (Ko, Sadler, Ryujin & Dong, 2003).

Screening guidelines. Filipino women who are recent immigrants to the United States are not as knowledgeable about breast cancer screening practices as their American counterparts (Wu & Bancroft, 2006). One possible explanation is that mammography is

widely known to be used as a diagnostic, rather than a screening tool in the Philippines. In one study, majority of Filipino women (n=248) had a knowledge gap about screening guidelines and only 34.7% (n=86) reported having sufficient knowledge about breast cancer (Ko, Sadler, Ryujin, & Dong, 2003). Knowledge of screening guidelines may be a strong predictor of mammogram adherence. If these women do not even know that they are supposed to go for a breast cancer screening despite absence of symptoms, they will not even think about scheduling for a screening mammography.

Importance of early detection. Filipino American women may not be aware of the benefits of early detection. In focus groups of Filipino physicians and Filipino women, lack of knowledge about the importance of breast cancer (early detection) was cited as one barrier to routine mammograms (Ho, Muraoka, Cuaresma, Guerrero & Agbayani, 2010).

Misconceptions. Filipino women also have misconceptions about breast cancer (Ko, Sadler, Ryujin & Dong, 2003; Wu, Hsieh & West, 2008). For example, Filipinas reported to having the belief that trauma to the breast could cause breast cancer. Also, the women believed that unless the healthcare provider recommended screening, mammograms were unnecessary. Another misconception reported by a Filipina was she did not have to get screening because she did not have a family history of breast cancer (Wu & Bancroft, 2006).

General lack of knowledge. In a focus group in one study (n=56), only half of the women knew that the best time to perform breast self-examination was not during one's menstrual period and only 14% (n=80) knew that the likelihood of cancer increased

with age. Ko, Sadler, Ryujin, and Dong (2003) reported that in a sample of 248 Filipino women, ages 20 to 77, only 34.7% reported that they had sufficient knowledge about breast cancer. This was the only study found that quantified Filipino immigrant women's knowledge about breast cancer or screening. However, a limitation of the study was that the participants were not comprehensively tested on their knowledge and understanding of breast cancer and screening guidelines.

Several studies have found a knowledge gap in Filipino American women in terms of the importance of screening and early detection, insurance coverage and other resources and screening guidelines (Ho, Muraoka, Cuaresma, Guerrero & Agbayani, 2010; Burke, et al., 2009; Wu, Hsieh & West, 2008; Wu, West, Chen & Hergert, 2006; Wu & Bancroft, 2006; Ko, Sadler, Ryujin & Dong, 2003). In all these studies, the women self-reported knowledge deficiencies about breast cancer health. No mammogram studies were found that objectively and comprehensively measured the knowledge level of Filipino women on breast cancer health and screening guidelines.

What we know about mammogram adherence in Filipino women is based on small sample sizes and many of these studies are outdated. To the best of my knowledge, this study will be the first one to quantify Filipino immigrant women's knowledge about screening guideline and breast cancer. Considering that these women migrated from a country where there is no government-issued screening guidelines nor vigorous public campaigns for mammogram, we need to assess, first and foremost, if Filipino American women are even aware of the benefits of a mammogram, the recommended age at which to start mammogram and the recommended time intervals between mammograms.

In one study involving a random sample of 1,463 Filipino, Latino, African American, Chinese and White women ages 40 to 74, Filipino women had the highest decisional balance (Otero-Sabogal, Stewart, Shema & Pasick, 2007). Decisional balance was the defined as the difference between appreciating the benefits minus the harms of a mammogram. In other words, within this 5 ethnic groups of women, Filipinas had the most appreciation of the benefits of a mammogram. However, in terms of mammogram use, Filipinas came in third. The implication of this study is that there is more to mammogram adherence in Filipinas than just knowing the pros and cons.

Need Factor: Mammogram Referral

There is extensive literature on how a healthcare provider influences breast cancer screening in Filipino women. In one study, the healthcare provider factor was operationalized through having a wellness visit and was found be consistent with higher screening rates for all 3 cancers – breast, colorectal and cervical (Maxwell, Bastani & Warda, 2000). In this same study, it was established that receiving a referral from a provider was the most important influence for mammogram use (AOR=32.50), although the researchers acknowledged that the effect size should be regarded with caution because of the large confidence interval (8.86-119.28). Regardless of English proficiency, a healthcare referral or reminder was found to be most determinative of mammogram uptake (Ko, Sadler, Ryujin & Dong, 2003).

Enabling Factors: Insurance and Sociocultural Deterrents

Enabling factors are access indicators that include insurance and ability to negotiate the healthcare system. In one study, insurance - not acculturation - explained

more variation in breast cancer screening in Filipino women. Lack of insurance was found to be negatively associated with mammogram adherence in Filipino American women (Pourat, Kagawa-Singer, Breen & Sripipatana, 2010). Otherwise stated, several studies have shown insurance to be associated with mammogram uptake among Filipino American women (Maxwell, Bastani & Warda, 2000; Otero-Sabogal, Stewart, Shema & Pasick, 2007). However, a significant barrier among Filipino American women could be simply understanding their insurance coverage. One Filipina had insurance but did not know that mammogram was covered by her health insurance until a year later (Wu & Bancroft, 2006).

Enabling factors include ability to navigate the U.S. healthcare system and not just insurance or ability to pay the health services (Pourat, Kagawa-Singer, Breen & Sripipatana, 2010). As one provider who worked at a community health clinic serving Filipino patients said:

> It's not the experience of the mammogram, but the environment, the process, the navigating the system, the eligibility [worker] telling them they have to pay…not enrolling them in the program they're supposed to.... Then you lose one and it's really, really hard because you spend so much time with them trying to get them to understand what a mammogram is (Burke, et al., 2009).

This lack of knowledge of the healthcare system can create a feeling of not being welcomed in the healthcare system (Joseph, Burke, Tuason, Barker & Pasick, 2009) and negatively influence mammogram adherence.

Predisposing Factors: Cultural Beliefs, Nativity and Length of U.S. Residence

Cultural factors and breast cancer literacy are central to the disparity in mammogram adherence and therefore are main foci of interest in this study. "Culture is not synonymous with ethnicity or race" (Ho, Muraoka, Cuaresma, Guerrero & Agbayani, 2010 p. 5). Culture is a set of "value orientations, beliefs, and norms that are socially shared among individuals from a particular population or society" (Flynn, Betancourt & Ormseth, 2011, p.3). More importantly, cultural factors shape beliefs about cancer and influence decisions about cancer screening (Betancourt, Flynn, Riggs & Garberoglio, 2010; Wu & Bancroft, 2006). Health behaviors oftentimes are outside the realm of rational or conscious decision-making and may be deeply ingrained in cultural beliefs (Bourdieu, 1990 as cited in Ho, Muraoka, Cuaresma, Guerrero & Agbayani, 2010).

Cultural factors influence cancer screening behaviors (Betancourt, Flynn, Riggs & Garberoglio, 2010) and are associated with low mammogram adherence rates which subsequently leads to late diagnosis (Ho, Muraoka, Cuaresma, Guerrero & Agbayani, 2010). In a mammogram study on Asian American women, the group with the highest level of education had lower mammogram rates (Kagawa-Singer, et al. 2007). So, there may be variables other than socioeconomic factors – such as cultural beliefs - that affect mammogram adherence in this population group.

Cultural factors as potential influencing screening behaviors have been operationalized in many ways. The first one is measuring cultural health beliefs directly such as fear of discovery of cancer (Ho, Muraoka, Cuaresma, Guerrero & Agbayani, 2010). Some studies indirectly operationalized culture through acculturation measures.

One study used the Short Acculturation Scale for Filipino American (SASFA) to predict mammogram adherence among Filipino American women. In this study, less acculturated Filipino women were "slightly less likely" to have ever had a mammogram than their counterparts who were more assimilated in the American culture (Maxwell, Bastani & Warda, 1997). Other ways that acculturation has been operationalized was through nativity, length of residence in the United States or percent of life in the United States (Maxwell, Bastani & Warda, 2010). The assumption is that the longer one has lived in the United States, cultural or health beliefs would then have less of an impact as one would be more assimilated to American culture. Another way that culture has been operationalized is English proficiency. English proficiency was significantly associated with of recent mammogram screening (Ryu, Crespi & Maxwell, 2013).

It is conceivable that these measures of culture – cultural beliefs such as fatalism, years of U.S. residence, English fluency and structural barriers – interplay with each other. For example, with increased length of residence also comes increase English fluency and less perceived barrier in terms of trying to schedule an appointment. With longer U.S. residency, it is quite possible that immigrant women acquire knowledge in navigating the healthcare system thereby enhancing mammogram adherence. For example, simply knowing where to go for a mammogram increased the odds (AOR 3.0) of having regular mammograms (Somkin, et al, 2004).

While some of these cultural factors have been identified, none of these studies have comprehensively measured variables using an instrument in Filipino American women. No study was found wherein cultural factors – as comprehensive as the items in

the Cultural Cancer Screening Scale – were statistically associated with mammogram adherence in this population group. This dissertation is going to be the first study to use the Cultural Cancer Screening Scale on Filipino women and to analyze the association between cultural factors and mammogram adherence.

Summary

Few mammogram studies on Filipino American women have been conducted. Of those few, many are outdated, and many have aggregated Filipino American women with Asian women. The studies have also been ridden with the problem of a small sample size or confined to respondents living in one geographic location or state, e.g. California or Hawaii. While previous studies have been able to identify barriers that deter Filipino women from going for a mammogram screening, none of the studies captured a wide scope of cultural dimensions and distilled factors into sociocultural deterrents, cancer fatalism, catastrophic disease expectations, symptomatic deterrents and negative beliefs about health professionals as the Cultural Cancer Screening Scale. Several studies have pointed to some evidence of lack of breast cancer literacy among Filipino American women, however, none have quantified the knowledge gap. This study is going to measure breast cancer literacy and determine its association with mammogram adherence in Filipino American women. Finally, this study is comprehensive in that it includes all 3 factors of the conceptual framework – need, enabling and predisposing – in the expanded version which includes variables for a vulnerable population group.

CHAPTER III

METHODS

A cross-sectional, descriptive and associational study was conducted with a convenience sample of Filipino American women. Logistic regression was performed to determine the association between mammogram adherence, as the dependent variable, vis-a-vis need, enabling and predisposing factors, as independent variables. Andersen's Behavioral Health Model for the Utilization of Health Services for Vulnerable Populations was used as the conceptual framework to determine if an association exists between the factors in the model and mammogram adherence in Filipino American women.

Sample

The focus of this study was Filipino women living in the United States. Inclusion criteria were: ≥40 years old, self-identified as Filipino, a U.S. resident and able to read and write in English. The age cut-off (40 years old) was based on the 2002 recommendations of the U.S. Preventive Services Task Force's guidelines on breast cancer screening. Excluded from the study were Filipino women who had been previously diagnosed with breast cancer or breast disease because the outcome variable of interest was a screening, not a diagnostic, mammogram. After the informed consent section of the survey, the filter questions with exclusion criteria locked out males, those

who were not Filipino, non-residents of the U.S., females younger than 40 years old or those who had been previously diagnosed with breast cancer or breast disease.

Calculation of sample size. An *a priori* power analysis for sample size was guided by Vittinghoff and McCulloch's (2007) rule of 5 to 9 events per independent variable. An event in this study was defined as the positive outcome of mammogram adherence. Positive event was determined to range from 45% to 81%. This range was based on the lowest published rate for recent immigrants was 46.6% (Centers for Disease Prevention and Control, 2012) and the most current mammogram adherence rate for Filipino Americans was 81.5% (95% CI, 67.5-90.4) (White et al., 2017). The positive outcome of 65% mammogram adherence was determined to be a reasonable assumption. Calculation of sample size was pegged at 7 events with 10 independent variables. Sample size was determined to be 108 but with a target of 120 respondents, accounting for 10% towards missing data or ineligibles.

Recruitment

Recruitment was conducted through personal contacts of family, friends and colleagues of the author which consisted of 84 email addresses. The email came with a request to forward the survey link to Filipino American women. In addition, the author made a preliminary inquiry with the President of the Philippine Nurses Association of America (PNAA) about this study. The Chair of the Research Committee of the PNAA disseminated the survey link to the chapter presidents who then forwarded the survey to its members.

In a study to promote cancer screening among older Filipino immigrants, face-to-face personal invitation by a friend or acquaintance was the most successful recruitment strategy and reported as ineffective recruitment strategies were sign-up tables, mailed invitations, flyers and church announcements (Maxwell, Bastani, Vida & Warda, 2005). The effectiveness of recruiting Filipino Americans through personal invitation was validated in this study. Some of the respondents in the original list of 84 women reported that they included a personal note to their friends, family and colleague before they forwarded the link. This personal note made a positive impact on recruitment. This validates the finding that being invited by a friend or family is an effective recruitment strategy among Filipinos (Maxwell, Bastani, Vida & Warda, 2005).

The survey was launched as soon as IRB approval was obtained. The self-administered survey was distributed electronically using an anonymous, reusable link generated by Qualtrics. The respondents were requested to forward the survey link. A thank you and reminder email was sent 2 weeks after the survey was launched. The survey closed one month after the initial email.

Measures

Data collection was done through the use of forms and 2 instruments combined into a survey for online administration. The online survey contained a demographic form, the Cultural Cancer Screening Scale (Betancourt, Flynn, Riggs and Garberoglio, 2010) and a Breast Cancer Screening Literacy Scale (Appendix A) that was developed by the author. Permission was granted by Dr. Betancourt to use the Cultural Cancer Screening Scale. Table 4 outlines the survey form containing the need, enabling and predisposing

factors, mammogram adherence status and demographic data. The outcome variable - mammogram adherence - was evaluated through the question: have you ever had a mammogram. Respondents whose most recent mammograms were 2 years or less were coded as 1 (adherent). Respondents who never had a mammogram were coded zero. Respondents whose most recent mammogram was more than 2 years old were coded as zero. Table 4 also outlines the demographic data collected and the predisposing, enabling and need factors as these correlate with the Breast Cancer Literacy Scale and the Cultural Cancer Screening Scale.

Table 4

Outline of Survey with Demographic Form, Breast Cancer Literacy Scale and Cultural Cancer Screening Scale

	Description
Exclusion questions	A respondent who answered male, non-Filipino, below 40 years of age, not residing in the United States or previously diagnosed with breast cancer or breast disease was excluded from the survey
Mammogram adherence	Have you ever had a mammogram?
Need	
Mammogram referral by a healthcare provider	Has a healthcare provider ever recommended that you go for a screening mammogram?
Breast cancer literacy	20-item Breast Cancer Literacy Scale
Enabling	
Insurance	Do you have health insurance?
Sociocultural Deterrents	7 items from the Cultural Cancer Screening Scale
Need	
Cultural Beliefs about Cancer	13 items from the Cultural Cancer Screening Scale
Nativity	Where were you born?
Years of residence in the United States	How many years have you been residing in the United States?
Demographic Form	Age, marital status, educational level, number of income earners in the household and number of age-eligible women who had at least one mammogram in the Philippines

Demographic data was in the last section of the survey and included: age group (40-49, 50-59, and ≥60 years), marital status, educational level, number of household members with employment. and number of age-eligible Filipino women who had had at least one mammogram in the Philippines.

Need variables were breast cancer literacy and mammogram referrals. Breast cancer literacy was measured using the 20-item Breast Cancer Literacy Scale. Mammogram referral was operationalized through the question: has a healthcare provider ever recommend that you go for a screening mammogram? No was coded as zero. "Yes, I was given a verbal referral to go for a screening mammogram" was coded 1. "Yes, I was given a written referral to go for a screening mammogram" was coded as 1. And "Yes, I was given both a verbal and a written referrals to go for a screening mammogram" was coded as 2. In addition, enabling variables were collected. Having health insurance was coded 1 for Yes and No was coded zero. The other enabling variable was sociocultural deterrents. This was measured by 7 items from the Cultural Cancer Screening Scale. Predisposing variables – nativity and years of U.S. residence – were measured. Nativity was coded as 1 if born in the United States, 2 if born in the Philippines and 3 if born elsewhere. Residence in the United States was measured in years. The other predisposing variables – beliefs about breast cancer and attitude towards healthcare – were measured using 13 items from the Cultural Cancer Screening Scale. The Cultural Cancer Screening Scale is discussed in a later section.

Figure 2 summarizes how the Cultural Cancer Screening Scale, the Breast Cancer Literacy Scale and other variables fit into Andersen's Behavioral Health Model of Services (Vulnerable Population). Andersen's Behavioral Model had 6 factors: need-traditional, need-vulnerable, enabling-traditional, enabling-vulnerable, predisposing-traditional and predisposing-vulnerable.

Figure 2

Operationalization of Andersen's Behavioral Health Model for the Utilization of Health Services for Vulnerable Populations

Predisposing →	**Enabling →**	**Need →**	**Health Behavior**
Traditional Domain	**Traditional Domain**	**Traditional Domain**	**Mammogram Adherence**
Cultural Cancer Screening Scale: cancer fatalism, symptomatic deterrents, catastrophic disease expectations subscales	Insurance status	Breast Cancer Literacy Scale	Most recent mammogram ≤2 years
Vulnerable Domain	**Vulnerable Domain**	**Vulnerable Domain**	
Nativity U.S. residence (years)	Cultural Cancer Screening Scale: Sociocultural deterrents subscale	Referral by a healthcare professional	

The Instruments

Cultural Cancer Screening Scale. The Cultural Cancer Screening Scale was developed by Betancourt and his associates (2010). This instrument was developed using the bottom-up approach wherein cultural items relevant to cancer screening were identified through semi-structured interviews of the target population, Latin American women and non-Hispanic White women (Betancourt, Flynn, Riggs & Garberoglio, 2010).

The purpose of the tool is to measure aspects of culture that potentially affect cancer screening behavior. Based on two previous studies on Latino, Non-Latino White and Black women, 5 domains of the Cultural Cancer Screening Scale emerged: cancer screening fatalism, negative beliefs about health professionals, catastrophic disease expectations, symptomatic deterrents and sociocultural deterrents (Betancourt, Flynn, Riggs & Garberoglio, 2010). The scale has 20 questions that pertain to each of these 5 domains:

Sociocultural Deterrents

1. Having problems making an appointment is a reason for not screening regularly.
2. Not knowing where I can be screened for breast cancer is a reason for not screening regularly.
3. Not being able to get time off work is a reason for not screening regularly.
4. Not having transportation to get to my appointment is a reason for not screening regularly.
5. Not receiving a reminder postcard is a reason for not screening for breast/cervical cancer regularly.
6. Having to take care of my children or family is a reason for not screening regularly.
7. Not having health insurance or the money to pay for the exam is a reason for not screening regularly.

Cancer Fatalism

8. It is not important to screen regularly because everyone will eventually die of something anyway.
9. It is not necessary to screen for breast/cervical cancer regularly because it is in God's hands anyway.

Symptomatic Deterrents

10. If nothing is physically wrong, then you do not need to screen.
11. Feeling healthy is a reason for not screening for breast/cervical cancer regularly.
12. Having several normal screening test results is a reason for not screening regularly.
13. Not feeling anything abnormal is a reason for not screening regularly.

Catastrophic Disease Expectations

14. Breast cancer is the worst thing that can happen to a woman.
15. Breast cancer is a deadly disease

Negative beliefs about healthcare professionals

16. Health professionals are not compassionate for what their patients are going through.
17. Health professionals are always in a hurry and do not have time for their patients.
18. I do not feel conformable with health professionals doing the screening examination.
19. Some health professionals inappropriately touch their patients during the screening examination.

20. Health professionals performing screening examinations are not trustworthy.

The responses to the items were all on a 7-point Likert scale as follows: 1 strongly disagree, 2 disagree, 3 slightly disagree, 4 neither agree nor disagree, 5 slightly agree, 6 agree and 7 strongly agree. A higher score indicated higher level of sociocultural deterrents, cancer fatalism, symptomatic deterrents, catastrophic disease expectations and negative beliefs about healthcare professionals. In the logistic regression models, it was expected that a higher score would reflect a lower odds ratio of mammogram adherence.

These 5 domains of the Cultural Cancer Screening Scale (CCSS) operationalized 2 factors of Andersen's Behavioral Model of Services for Vulnerable Populations (ABHMS-VP): predisposing-traditional and enabling-vulnerable. Predisposing-traditional of Andersen's model was operationalized with cancer fatalism, symptomatic deterrents, catastrophic disease expectations and negative health beliefs about health professionals subscales of the CCSS. Enabling-vulnerable of Andersen's model was operationalized with the sociocultural deterrents subscale of the CCSS. Table 5 shows how the subscales of the Cultural Cancer Screening Scale were reflected in the predisposing and enabling factors of Andersen's Behavioral Health Model and the how these were operationalized by the items of the CCSS.

Table 5

Operationalization of Andersen's Behavioral Health Model Factors with the Cultural Cancer Screening Subscales

Factors	Cultural Cancer Screening Subscale	Items from the Cultural Cancer Screening Scale
Enabling Factor - Vulnerable Domain		
Competing needs Ability to negotiate the system Transportation	Sociocultural deterrents	1) Having problems making an appointment is a reason for not screening regularly. 2) Not knowing where I can be screened for breast cancer is a reason for not screening regularly. 3) Not being able to get time off work is a reason for not screening regularly. 4) Not having transportation to get to my appointment is a reason for not screening regularly. 5) Not receiving a reminder postcard is a reason for not screening for breast/cervical cancer regularly. 6) Having to take care of my children or family is a reason for not screening regularly. 7)Not having health insurance or the money to pay for the exam is a reason for not screening regularly.

Table 5 – continued

Factors	Cultural Cancer Screening Subscale	Items from the Cultural Cancer Screening Scale
Predisposing - Traditional Domain		
Beliefs about breast cancer	Cancer Fatalism	8) It is not important to screen regularly because everyone will eventually die of something anyway. 9) It is not necessary to screen for breast/cervical cancer regularly because it is in God's hands anyway.
	Symptomatic Deterrents	10) If nothing is physically wrong, then you do not need to screen. 11) Feeling healthy is a reason for not screening for breast/cervical cancer regularly. 12) Having several normal screening test results is a reason for not screening regularly. 13) Not feeling anything abnormal is a reason for not screening regularly.
	Catastrophic Disease Expectations	14) Breast/cervical cancer is the worst thing that can happen to a woman. 15) Breast/cervical cancer is a deadly disease.

Table 5 – continued

	Cultural Cancer Screening Subscale	Items from the Cultural Cancer Screening Scale
Predisposing - Traditional Domain		
Attitudes toward healthcare	Negative beliefs about healthcare professionals	16) Health professionals are not compassionate for what their patients are going through. 17) Health professionals are always in a hurry and do not have time for their patients. 18) I do not feel comfortable with health professionals doing the screening examination. 19) Some health professionals inappropriately touch their patients during the screening examination. 20) Health professionals performing screening examinations are not trustworthy.

The reliability coefficients of the Cultural Cancer Screening Scale have been estimated in Hispanic, Anglo and African American women (Betancourt, Flynn, Riggs & Garberoglio, 2010; Jerome-D'Emilia & Chittams, 2015). In the Betancourt (2010) study on Latino and Anglo women, factor analysis reduced the scale to 5 dimensions with reliability coefficients of .69 for catastrophic disease expectations, .75 for cancer screening fatalism, .77 for negative beliefs about health professionals, .83 for sociocultural deterrents and .89 for symptomatic deterrents. In the Jerome-D'Emilia (2015) study on African American women, factor analysis revealed the same dimensions but reliability coefficients for the 5 subscales were not reported.

Mammogram studies conducted on Filipino women have reported several health beliefs and attitudes that influence mammogram adherence e.g. competing priorities (Wu & Bancroft, 2006), time constraints (Ko, Sadler, Ryujin & Dong, 2003), navigation issues (e.g. Burke et al., 2009) and fear of discovery of cancer (Wu, West, Chen & Hergert, 2006). These cultural beliefs and attitudes were operationalized in the Cultural Cancer Screening Scale (CCSS). For example, competing priorities were operationalized by Items 3 and Item 6 of the sociocultural deterrents subscale in the CCSS. Navigation issues were operationalized by Items 1, 2 and 4 of the sociocultural deterrents subscale. Fear of discovery of cancer was operationalized by the catastrophic disease expectations subscale which were Items 14 and 15 in the CCSS. Thus, the use of the Cultural Cancer Screening Scale was consistent with the framework. This was the first time that this instrument was used in Filipino American women.

A limitation of the Cultural Cancer Screening Scale was that it did not include some of the enabling and predisposing cultural variables that have been identified as important by Filipino women namely: lack of knowledge about screening guidelines and misconceptions about breast cancer. Thus, an instrument was created to assess a Filipino American woman's knowledge about breast cancer and screening guidelines. The tool was developed from national guidelines, scientific literature on health literacy and breast cancer prevention on underserved populations, as well as the investigator's professional and personal experience.

Breast Cancer Literacy Scale. The Breast Cancer Literacy Scale operationalized the need-traditional factor of Andersen's Behavioral Health Model. The Breast Cancer

Literacy Scale aims to measure the knowledge level of screening guidelines, breast cancer risks, insurance payments and breast cancer in general. Lack of knowledge about breast cancer screening guidelines was evident from prior studies (Wu & Bancroft, 2006; Ko, Sadler, Ryujin & Dong, 2003). One major reason is that there is a lack of emphasis of breast cancer screening in the country of origin. So there were 11 items that assessed respondents' knowledge of mammography and screening guidelines. These items were developed from the American Cancer Society and the U.S. Preventive Services Task Force guidelines. Some items for the Breast Cancer Literacy Scale were developed from a review of the mammogram studies done on Filipino women which reported Filipino American women's lack of understanding of the benefits of early screening (Wu, Hsieh &West, 2008). For example, Item #9 in the Breast Cancer Literacy Scale - If you don't feel pain or lump in my breast then you do not have to go for a mammogram - was based on the research done by Wu and Bancroft (2006) who reported that several Filipino participants in their study reported that if they did not feel anything different in their breasts, then they would not get screened.

Content of the Breast Cancer Literacy Scale was evaluated by three experienced nurses. One nurse had worked as an oncology nurse for 8 years, the second nurse was an oncology certified nurse and the third nurse was a women's health nurse practitioner. Of the 20 items, the first 11 questions pertained to knowledge about mammography and screening guidelines and the second set of 9 questions pertained to knowledge about breast cancer and its risks. The correct response to the items in the Breast Cancer Literacy Scale (BCLS) were summed, with higher scores indicating greater breast cancer literacy.

The reliability of the Breast Cancer Literacy Scale was estimated using the Kuder-Richardson Formula 20 (KR-20) coefficient. KR-20 measures the reliability of the scores of an instrument that has a dichotomy of scores - e.g. correct and incorrect (McDonald, 2017). Table 6 summarizes the scoring of the Breast Cancer Literacy Scale.

Table 6

Breast Cancer Literacy Scale and Coding of Responses

Items	**Coding of Responses**
1) A mammogram is an x-ray of the breast that looks for changes that may be signs of breast cancer.	True = 1, False = 0
2) Mammogram is an effective method of detecting breast cancer in the earliest stage.	True = 1, False = 0
3) Mammograms are not perfect in that they can miss some cancers.	True = 1, False = 0
4) A woman has the option to begin screening at age 40.	True = 1, False = 0
5) A woman without a family history of breast cancer should get her first mammogram at age…40, 45, 50, 55.	40=0; 45=1; 50=1; 55=0
7) For women >55 years old, a mammogram should be done a) every year b) every 2 years.	True = 1, False = 0
8) The Affordable Care Act requires screening mammography to be covered by all new health insurance plans so that mammograms can be offered without any cost to women.	a = 0, b=1
9) If a woman has breast implants, she cannot get mammograms.	True = 0, False = 1
10) The benefits of mammography outweigh any potential harm from radiation exposure.	True = 1, False = 0
11) If you don't feel pain or a lump in your breast then you do not have to go for a mammogram.	
12) Most women who develop breast cancer do not have a family history of breast cancer.	True = 1, False = 0
13) If a woman finds a lump in her breast, it is most likely breast cancer.	True = 0, False = 1
14) Trauma or mechanical injury to the breast can cause breast cancer.	True = 0, False = 1
15) The earlier stage that breast cancer is discovered, the better the survival.	True = 1, False = 0
16) Men can be diagnosed with breast cancer.	True = 1, False = 0
17) Excluding skin cancer, breast cancer is the most commonly diagnosed cancer in women of all races.	True = 1, False = 0
18) When the tumor is small, breast cancer typically has no symptoms.	True = 1, False = 0
19) A cancerous tumor in the breast is usually painful.	True = 0, False = 1
20) Breast cancer increases with age.	True = 1, False = 0

The Pilot Study

A pilot study of this dissertation was conducted to determine recruitment strategies, administration procedures, survey burden, face validity of the Breast Cancer Literacy Scale (BCLS), readability of the items in the BLCS and the Cultural Cancer Screening Scale. The survey instrument was administered electronically through Qualtrics (2017 version, Provo, UT) using a link in an email. There were 18 respondents, 10 of whom were then personally interviewed by the principal investigator regarding the survey's response burden, relevance of the items, readability of the questions, completeness of the survey and technical issues.

The Flesch-Kincaid grade level of the entire survey was 8.7 and Flesch reading ease was 55. The participants had no problems understanding the questions with the exception of 2 respondents who said that reading the double negative statements in the Cultural Cancer Screening Scale (e.g., not having transportation is a reason not to go for regular screening) was a bit of a problem. These 2 respondents rated these double negative statements as 6 out of 7 - with 7 as no difficulty reading the statement. Respondents rated all the items as relevant. All but one respondent viewed the survey as no bother at all. The average time to complete the survey was 30 minutes.

Refinements were made to the final version of the survey for the dissertation study in terms of Qualtrics features and content which included revising response choices to the mammogram referral and other questions. Also, one item was added to the Breast Cancer Literacy Scale.

Mammogram Adherence

Mammogram screening has been operationalized in many ways: ever had a mammogram (Ryu, Crespi & Maxwell, 2013), mammogram within the past year (Champion & Huster, 1995), mammogram within the past 2 years (e.g. Ryu, Crespi & Maxwell, 2013), intention to have a mammogram (Champion & Huster, 1995) or intention to have a repeat mammogram (Bowie, Curbow, Laveist, Fitzgerald & Zabora, 2003). In this study, mammogram adherence as the outcome variable was operationalized with the item: Have you ever had a screening mammogram? And the options were: 1) No, I never had had a mammogram. 2) Yes, I had a mammogram and it was ≤2 years ago, 3) Yes, I had a mammogram and it was > 2 years. A *no* response to the question was coded as 0 and non-adherent. A response of "> 2 years" was likewise coded as 0 and non-adherent. Only option 2 (< 2years) was defined as mammogram-adherent. This question in Qualtrics was configured to have a forced response.

Data Analyses

Descriptive statistics for the sample characteristics and mean scores (standard deviation, 95% confidence interval) for the two instruments (Cultural Cancer Screening Scale [CCSS] and Breast Cancer Literacy Scale [BCLS]) were estimated. Missing data were calculated for the variables. Mann-Whitney U test was estimated to determine if there was a statistically significant difference in the BCLS and CCSS mean scores between those Filipino American women who were mammogram adherent and those who were not adherent. Reliability coefficients were calculated for both instruments.

Following the Andersen's Behavioral Health Model for the Utilization of Services for Vulnerable Populations, 3 factors were postulated to be associated with mammogram adherence: predisposing, enabling and need. Each factor had 2 domains, thus, the overall model had 6 categories of variables: need-traditional, need-vulnerable, enabling-traditional, enabling-vulnerable, predisposing-traditional and predisposing-vulnerable. Logistic regression models were used to estimate the direction and magnitude of association between these set of predisposing, enabling and need variables and mammogram adherence. Four logistic regression models were analyzed which corresponded to the 4 research questions as discussed below.

Wald's statistics were calculated for Model 1, Model 2 and Model 3. The goodness-of-fit of Model 4, the full model, was calculated using Hosmer and Lemeshow statistic. Influential cases were checked using centered leverage values, Cook's distance and DFBetas. Area under the receiver operating curve (ROC) statistic was determined to assess sensitivity and specificity and assess the model's discriminatory performance (Kleinbaum & Klein, 2010). Statistical significance levels were established at alpha = 0.05 (2-tailed). SPSS version 25 (IBM Corp., Armonk, NY) was used to perform the statistical analyses.

Research Question 1

The need factor in the model is the immediate precursor that moves a person to seek health services - that is the proximate cause that moves a woman to go for a mammogram. In contrast to an acute episode of illness, where the need to go to a healthcare provider might be pain or debilitating symptoms, the need factor in cancer

screening is knowledge about the mammogram screening guidelines and about breast cancer. But for vulnerable population groups, like Filipino American women especially recent immigrants, a mammogram referral from a healthcare provider may be that needed impetus for them to go for a mammogram. Thus, the variables under the need factor are breast literacy and mammogram referral.

Research Question 1. What need factors, if any, are associated with mammogram adherence in Filipino American women?

Need-traditional

- Is there an association between breast cancer literacy and mammogram adherence in Filipino American women?

Need-vulnerable

- Is there an association between a health professional referral for a mammogram and mammogram adherence in Filipino American women?

Data Analysis for Research Question 1. A logistic regression model, Model 1, estimated the association between the need variables (breast cancer literacy and mammogram referral) and mammogram adherence. The need variables were entered simultaneously. Adjusted odds ratios, confidence intervals and Wald's statistic were estimated for these 2 need variables.

Need-traditional domain. The need-traditional domain was operationalized by the 20-item Breast Cancer Literacy Scale. Higher scores meant higher knowledge level. If a woman knows the parameters of initiating mammograms and screening guidelines, she is then made aware that she is eligible to screen and that there is a

legitimate need for her to go for screening. Thus, *need* was operationalized by knowledge about mammography and screening guidelines.

Need-vulnerable domain. The independent variable for the need factor in the vulnerable domain was a healthcare professional referral for a screening mammogram. With a referral from a health professional, a woman is then made aware that a mammogram is a recommended preventive cancer screening for her. Filipino American women rely heavily on their healthcare provider for health information (Ko, Sadler, Ryujin & Dong, 2003) and so recommendation from a healthcare provider is highly associated with mammogram utilization in this ethnic group (Wu & Bancroft, 2006). One study reported that a healthcare professional's referral had the strongest association with the use of screening mammography (Maxwell, Bastani & Warda, 1997). Thus, *need* in the vulnerable population was operationalized with the item: Has a healthcare professional ever recommended that you go for a mammogram? No was coded as 0. Either a verbal or a written referral was coded as 1. Receiving both written and verbal referrals were coded as 2.

Research Question 2

The enabling variables in the model are access factors and are characterized by financial and logistical means that make it feasible for women to go for a screening mammogram. Thus, enabling variable in the traditional domain was measured by health insurance status. For a native-born American, insurance may be all that she needs to go for a mammogram. However, in the vulnerable population groups, sociocultural

deterrents may pose as an additional barrier. Sociocultural deterrents are navigational problems such as transportation and scheduling for an appointment. Thus, enabling variables under the enabling factor are insurance and sociocultural deterrents.

Research Question 2. What enabling factors, if any, are associated with mammogram adherence in Filipino American women?

Enabling-traditional

- Is there an association between insurance and mammogram adherence in Filipino American women?

Enabling-vulnerable

- Is there an association between sociocultural deterrents and mammogram adherence in Filipino American women?

Data Analysis for Research Question 2. A logistic regression model, Model 2, analyzed the association between enabling variables (insurance and sociocultural deterrents) and mammogram adherence. The enabling variables were entered simultaneously. Adjusted odds ratios, confidence intervals and Wald's statistic were estimated for these 2 enabling variables.

Enabling-traditional domain. The enabling factor in the traditional domain was health insurance and this variable was operationalized with a categorical *yes* or *no* response to the question, do you have health insurance? Having health insurance status was coded: yes=1 and no=0.

Enabling-vulnerable domain. The enabling factors in the vulnerable in Andersen's Behavioral Model include ability to negotiate the healthcare system, competing

needs, and time constraints. This enabling-vulnerable factor was operationalized by 7 items from the sociocultural deterrents subscale of the Cultural Cancer Screening Scale. Responses were on a 7-point Likert scale where a higher score indicated higher sociocultural deterrence.

Research Question 3

As postulated by Andersen's behavioral model, predisposing variables are least influential in influencing health behavior, in this study, mammogram adherence. The predisposing variables in Andersen's behavioral model are characterized by cultural beliefs including beliefs about breast cancer and attitudes toward healthcare professionals. In the vulnerable domain, additional variables may influence a woman's propensity to go for a screening, these would be nativity and years of residence in the United States. Nativity would be important especially if the woman is coming from a country where there are no nationally recognized mammogram screening guidelines - such as, the Philippines. The length of U.S. residence would be an important consideration because with longer residence in the U.S., the woman then becomes more familiar with U.S. screening guidelines and becomes more acculturated to the health behaviors of native-born Americans and learns how to navigate the healthcare system. Thus, the variables in the predisposing factor of Andersen's model are cultural beliefs, nativity and years of U.S. residence.

Research Question 3. What predisposing variables, if any, are associated with mammogram adherence in Filipino American women?

Predisposing-Traditional

- Is there an association between cancer fatalism, symptomatic deterrents, catastrophic disease expectations, and negative attitudes about health professionals and mammogram adherence in Filipino American women?

Predisposing-Vulnerable

- Is there an association between nativity and mammogram adherence among Filipino American women?
- Is there an association between years of U.S. residence and mammogram adherence in Filipino American women?

Data analysis for Research Question 3. A logistic regression model, Model 3, analyzed the association between predisposing variables (cultural beliefs, nativity and length of U.S. residence) and mammogram adherence. The predisposing variables were entered simultaneously. Adjusted odds ratios, confidence intervals and Wald's statistic were estimated for these 2 enabling variables.

Predisposing-Traditional Domain. Cultural beliefs about breast cancer and screening mammograms were measured with 13 items from the Cultural Cancer Screening Scale. These items were on a Likert scale where a higher score meant higher cancer fatalism, symptomatic deterrents, catastrophic disease expectations and negative beliefs towards healthcare professionals.

Predisposing-Vulnerable Domain. In the vulnerable domain, predisposing factor was characterized by nativity and immigration history. Nativity was operationalized by a categorical response to country of birth and immigration

history was operationalized with years of residence in the United States (a continuous variable).

Research Question 4

Logistic regression model 4 corresponded to research question 4: What *need, enabling* and *redisposing* factors are associated with mammogram adherence in Filipino American women? All independent variables from the need, enabling and predisposing factors were entered in Model 4 simultaneously. Adjusted odds ratios with confidence intervals were estimated. Assumptions requisite of a logistic regression model were analyzed. Multicollinearity was tested with VIF statistics. Cell frequencies were checked through crosstabulation of categorical variables with the outcome variable, mammogram adherence.

Protection of Human Subjects

This research was submitted for approval to UNCG's Institutional Review Board to ensure that the rights, privacy and anonymity of participants were respected and that their information or data collected was password protected and secured on servers. The study involved the collection of data that was determinative of a woman's knowledge of breast cancer, mammogram guidelines and cultural beliefs about breast cancer. The study did not involve any invasive collection of specimens. Risks to participants were minimal, and the IRB approved the study protocol. Confidentiality of responses was preserved through layers of institutional and individual passwords to data access.

Income level was not asked to avoid embarrassment and missing data. In one cancer screening study on Korean and Filipino immigrants, income had many missing

values and was highly associated with education (Maxwell, Bastani & Warda, 2000). Thus, only educational level and the number of people in the household with employment were collected as demographic data. To encourage participation, a chance to win one of 4 gift certificates worth $50 each was given.

Summary

The purpose of this research was to investigate the association between predisposing, enabling and need factors and mammogram adherence in Filipino American women. The Andersen's Behavioral Health Model for the Utilization of Services for Vulnerable Populations guided the classification and entry of variables in the logistic regression models. Independent variables for the need, enabling and predisposing factors in both traditional and vulnerable domains were used for analyses. Three instruments were used: a demographic form, the Cultural Cancer Screening Scale and the Breast Cancer Literacy Scale. Human subject protection measures were ensured throughout the recruitment, data collection and data analysis procedures.

CHAPTER IV

RESULTS

Description of Sample

A total of 190 respondents accessed the survey link. Eight respondents did not go past the informed consent page. Of the 182 women who gave their consent, 25 did not meet the inclusion criteria. All in all, 157 were included in the data set. Of these 157, 5 exited out at varying points of the survey. Sample characteristics of the 157 Filipino American women are provided in Table 7. This study's sample is different from previous studies due to their educational background. A third (n=53, 33.8%) of the respondents had some post-graduate credits or had a graduate degree. Ninety-four (59.9%) of the women had a college degree and only 4 women had less than a college degree. A majority of these Filipino American women lived in a household where there were at least two incomes (n=117, 79.6%) and twenty-eight (17.8%) Filipino American women lived in one-income households. Not surprisingly, 95.5% (n=150) had health insurance. Even with 6 (3.8%) women living in a household with no income-earner, only 3 (1.9%) had no health insurance. Despite these economic advantages, only 79.6% (n=125) were adherent, that is, their most recent mammograms were 2 years or less. Nine women (5.7%) had never had a mammogram and 14.6% (n=23) had not had a mammogram in more than 2 years.

Table 7

Sample Characteristics of Filipino American Women (n=157).

	Frequency (%)	Missing Data N (%)
Age		
40-49	45 (28.7)	
50-59	80 (51.0)	
≥60	32 (20.4)	
Marital Status		6 (3.8)
Single/Widowed	9 (5.7)	
Married	131 (83.4)	
Divorced/Separated	11 (7.0)	
Education		6 (3.8)
Some grade school or graduate	1 (0.6)	
Some high school or graduate	2 (1.3)	
Some college	1 (0.6)	
College graduate	94 (59.9)	
Some graduate or a graduate degree	53 (33.8)	
Household Employment		6 (3.8)
0-currently employed	6 (3.8)	
1-currently employed	28 (17.8)	
2 or more currently employed	117 (74.5)	
Health Insurance		4 (2.5)
Yes	150 (95.5)	
None	3 (1.9)	
Nativity		4 (2.5)
US born	5 (3.2)	
Philippines or other	148 (94.3)	
US residence (in years)	*25.09 (±11.18)	5 (3.2)
Mammogram Adherence		
Never had a mammogram	9 (5.7)	
Mammogram >2 years	23 (14.6)	
Mammogram ≤ 2 years	125 (79.6)	
Ever had a mammogram in Philippines		20 (12.7)
Left the Philippines <40	123 (78.3)	
Left the Philippines ≥40, no mammogram	8 (5.1)	
Left the Philippines ≥40, at least 1 mammogram	4 (2.5)	

*Mean (Standard Deviation)

About half (51.0%; n=80) of the respondents were in the 50-59 age group, 28.7% (n=45) were between the ages of 40 and 49, and 20.4% (n=32) were 60 or over. Majority of the Filipino women (83.4%) were married. Only 5 respondents were born in the United States, the remaining women (n=148, 94.3%) were born in the Philippines. Nobody reported having been born outside the United States or the Philippines.

Respondents came from 22 states and the states that had the most respondents were: California (n=47, 29.9%), North Carolina (n=14, 8.9%), Pennsylvania (n=13, 8.3%), New Jersey (n=12, 7.6%), Texas (n=12, 7.6%) and Virginia (n=10, 6.4%). Appendix B shows the distribution of respondents by geographical states. The mean length of stay in the United States was 25.09 years (SD±11.18).

As has been mentioned, 125 or 79.6% (95% CI, .73.3, 86.0) of the Filipino American women were mammogram adherent, which was close to the HP2020 goal of 81.1%. However, this is still less than expected considering 95.5% had insurance. Of the 12 respondents who left the Philippines at age 40 or over, only 4 Filipino women had had at least one mammogram in the Philippines, 8 women never had a mammogram in the Philippines despite being age-eligible.

In terms of outcomes, the Breast Cancer Literacy Scale (BCLS) had a mean score of 16.95 (95% CI, 16.67, 17.23) which indicated a good literacy level in this sample. For the Cultural Cancer Screening Scale, the sociocultural deterrents subscale's mean score was 19.05 (±8.28) with a possible range of 7 to 49 where the higher value denoted a higher perception of structural barriers (such as time, transportation or scheduling) to go for a screening mammogram. This meant that for this group of Filipino American

women, navigation deterrents were not perceived as barriers to mammogram use. Likewise, the Filipino women in this sample had a low level of fatalism, 3.12 (±2.14) out of a possible maximum of 14. The mean score for symptomatic deterrents was also low (7.32; ±4.65) - out of a maximum possible value of 28 - indicating that women understood, for example, the importance of regular screening despite a series of normal mammograms. Only the mean for the catastrophic disease expectations subscale was high at 9.51 (±3.35;) - out of a possible maximum of 14 - which indicated that women felt that breast cancer was a deadly disease and it is the worst thing that can happen to a woman. The means for each of the CCSS subscales and BCLS score are shown in Table 8.

Table 8

Descriptive Statistics for Breast Cancer Literacy Scale Scores and Cultural Cancer Screening Scale Subscale Scores (n=151)

	No. of Items	Possible Range	Mean	SD	CI Lower Bound	CI Upper Bound
Breast Cancer Literacy Scale	20	0-20	16.95	1.76	16.67	17.23
Cultural Cancer Screening Scale						
Sociocultural deterrents	7	7-49	19.05	9.05	17.59	20.50
Fatalism	2	2-14	3.11	2.14	2.78	3.46
Symptomatic deterrents	4	4-28	7.32	4.65	6.57	8.07
Catastrophic disease expectations	2	2-14	9.51	3.35	8.97	10.05
Negative beliefs about healthcare professionals	5	5-35	11.95	4.36	11.25	12.65

SD, standard deviation; CI, confidence interval

Table 9 shows the mean scores for the BCLS were 16.45 for non-adherent women and 17.10 for adherent women, out of a possible perfect score of 20. This would be expected for adherent women to have a higher score for the literacy scale even though the difference was not statistically significant (*p*-value=.07). Table 9 also shows the mean scores for the 5 subscales of the Cultural Cancer Screening Scale. Without exception, the average scores on the CCSS for the non-adherent group of women were higher than for the adherent group of women on all 5 subscales. This was expected because, for example, a higher score for the sociocultural deterrents subscale meant that there was a higher perception of problems of scheduling, transportation and knowing where to access. However, Mann-Whitney independent t-tests revealed that only two subscale scores - fatalism (*p*-value=.002) and symptomatic deterrents (*p*-value=.007) - were significantly different between adherence status groups. Thus, sociocultural deterrents, catastrophic disease expectations and negative beliefs about healthcare professionals mean scores did not significantly distinguish the adherent and the non-adherent groups.

Table 9

Significance Testing between Non-Adherent and Adherent Women for Breast Cancer Literacy Scores and Cultural Cancer Screening Subscale Scores

	Non-Adherent			Adherent			Mann-Whitney *p*-value.
	N	Means	SD	N	Means	SD	
Breast Cancer Literacy Scale	31	16.45	2.00	122	17.10	1.67	.077
Cultural Cancer Screening Scale							
Sociocultural deterrents	31	20.77	8.31	121	18.69	9.23	.143
Fatalism	31	3.94	2.69	121	2.93	1.92	.002
Symptomatic deterrents	31	9.61	6.21	121	6.74	3.96	.007
Catastrophic disease expectations	31	9.84	3.74	121	9.46	3.27	.459
Negative beliefs about HCP	31	12.84	3.89	120	11.72	4.46	.132

Note: HCP, healthcare professionals; SD, standard deviation; sig., significance

Assumptions and Reliability

Ratio of cases to variables. Table 10 shows the crosstabulation of categorical variables with mammogram adherence. Two cells did not meet the assumption of each cell having a value of >1 as shown in Table 10. These 2 cells are: no health insurance but mammogram adherent and US-born but not mammogram adherent. Based on these cell frequencies, the nativity (US-born vs. not US-born) and health insurance status variables were removed from further analysis.

Table 10

Crosstabulation of Categorical Independent Variables, by Mammogram Adherence (n=157)

	Non-adherent N	Adherent N	Missing N (%)
Health Insurance			4 (2.5%)
Yes	29	121	
No	2	1	
Nativity (n=153)			4 (2.5%)
US	1	4	
Philippines or other	30	118	

Multicollinearity. There was lack of evidence of multicollinearity among the continuous independent variables. The variance inflation factor (VIF) with the highest value was 1.744 for the symptomatic deterrent subscale of the Cultural Cancer Screening Scale. The lowest VIF was for the independent variable, the number of times the healthcare professional gave a mammogram referral (VIF=1.072). VIFs of all independent variables were within the range to where it was concluded that multicollinearity did not exist among the variables.

Breast Cancer Literacy Scale. The point biserials and difficulty ratings of the items are summarized in Table 11. The KR-20 of the Breast Cancer Literacy Scale was .301. This low discrimination index could partially be attributed to the low point biserials of the 20 items including 3 items that had negative point biserials. The highest point biserial was .285 for Item 17 (A cancerous tumor is usually painful). In addition, the difficulty ratings of the items were low (i.e. large majority of the respondents were able

to answer most of the questions correctly). The discrimination index (point biserials) is affected by the difficulty rating of the item (Smith, Hicks & Hayward, 1991). Nine of the 20 items of the Breast Cancer Literacy Scale had a correct response of 92.9% or higher. It has been suggested that the difficulty rating of an item should be near 50% (Grondlund, 1988 as cited in Smith, Hicks & Hayward, 1991) and as the difficulty rating deviates from the 50% mark, the discrimination index will drop (Baumgartner & Jackson, 1982 as cited in Smith, Hicks & Hayward, 1991). The difficulty of the items being low may be explained by the educational level of the respondents, some of whom were nurses and medical doctors.

Deletion of 7 items (Items 4, 6, 7, 14, 15, 18, and 19) would yield an improvement of BCLS's KR-20 but not by much. The greatest improvement would be deleting Item 6 which asks - For women 55 years old and above, screening mammograms should be done: a) annually, or b) every 2 years. This is a problematic question in that American Cancer Society recommends screening mammogram every 2 years. However, the 2002 recommendation of the U.S. Preventive Services Task Force is every 1 to 2 years for women 40 years or older.

Table 11

Item Analysis of Breast Cancer Literacy Scale Items

	Point Biserial	Difficulty Rating (%)	KR-20 with Item Deletion	Missing Data N (%)
Item 1	.193	94.8	.273	2 (1.3%)
Item 2	.010	93.5	.280	2 (1.3%)
Item 3	.246	92.9	.259	3 (1.9%)
Item 4	.000	81.2	**.311**	3 (1.9%)
Item 5	NA	99.4	.293	3 (1.9%)
Item 6	.035	68.2	**.340**	3 (1.9%)
Item 7	-.011	88.9	**.318**	4 (2.5%)
Item 8	.073	98.7	.294	4 (2.5%)
Item 9	.167	99.3	.287	4 (2.5%)
Item 10	.202	81.0	.263	4 (2.5%)
Item 11	.218	88.2	.266	4 (2.5%)
Item 12	.120	81.7	.290	4 (2.5%)
Item 13	.068	53.6	.268	4 (2.5%)
Item 14	-.035	93.5	**.330**	4 (2.5%)
Item 15	-.044	95.4	**.310**	4 (2.5%)
Item 16	.207	89.5	.266	4 (2.5%)
Item 17	.285	73.9	.223	4 (2.5%)
Item 18	.008	60.1	**.306**	4 (2.5%)
Item 19	.047	62.1	**.320**	4 (2.5%)
Item 20*	NA	100.0	NA	4 (2.5%)

KR, Kuder-Richardson; NA, not applicable, items were deleted from analysis because of zero variance

Cultural Cancer Screening Scale (CCSS). Table 12 summarizes the reliability indices of each subscale with Cronbach's alpha for each item deletion. The 2-item catastrophic disease expectations subscale had the lowest reliability with a Cronbach alpha of .564. The highest Cronbach alpha (.880) was for the symptomatic deterrents subscale. This subscale would have a further improvement (.890) with the deletion of Item 10 which states: If nothing is physically wrong then you do not need to screen. The

sociocultural deterrents subscale had a good reliability coefficient (Cronbach alpha= .790). Deletion of Item 1 from the sociocultural deterrents subscale - Having problems making an appoint is a reason not to go for regular screening - would improve the Cronbach alpha from .790 to .827. Finally, deleting Item 17 - Healthcare professionals are always in a hurry and do not have time for their patients - would increase the reliability index of the negative beliefs about healthcare professional subscale from 671 to .680. No other item deletions were warranted. The second highest Cronbach alpha (.823) was for the fatalism subscale. However, the fatalism subscale and the catastrophic disease expectations subscale had only 2 items each, for which reason no Cronbach alpha was reported for an item deletion.

Table 12

Reliability Coefficients of the Cultural Cancer Screening Subscales

	Cronbach If item is deleted	Cronbach's Alpha
Sociocultural deterrents (n=152)		.790
Item 1	**.827**	
Item 2	.778	
Item 3	.728	
Item 4	.747	
Item 5	.758	
Item 6	.724	
Item 7	.771	
Fatalism (n=152)		.823
Item 8	-	
Item 9	-	
Symptomatic deterrents (n=152)		.880
Item 10	**.890**	
Item 11	.860	
Item 12	.821	
Item 13	.847	
Catastrophic disease expectations (n=152)		.564
Item 14	-	
Item 15	-	
Negative beliefs about HCPs (n=151)		.671
Item 16	.571	
Item 17	**.680**	
Item 18	.640	
Item 19	.637	
Item 20	.570	

HCP, healthcare professionals

Research Question 1

What need factors, if any, were associated with mammogram adherence in Filipino American women?

Need Factor in the Population Domain

- Was there an association between breast cancer literacy and mammogram adherence in Filipino American women?

Need Factor in the Vulnerable Domain

- Was there an association between a health professional referral for a mammogram and mammogram adherence in Filipino American women?

Table 13 shows that only a mammogram referral from a healthcare provider is significant (*p*-value=.047), but breast cancer literacy is not (*p*-value=.065). Between these 2 need factors, a mammogram referral was more strongly associated with mammogram adherence (Wald=3.956) compared to breast cancer literacy (Wald=3.408). Thus, Filipino American women had 86.8% increased odds (AOR=1.868; 95% CI, 1.009, 3.458; *p*-value=.047) of being mammogram adherent as opposed to being non-adherent for each additional mammogram referral from a healthcare provider, controlling for breast cancer literacy.

Table 13

Logistic Regression Model 1, Model 2 and Model 3 for Mammogram Adherence

	AOR	95% CI	p-value	Wald statistic
Model 1: Need (n=153)				
Breast cancer literacy score	1.232	0.987, 1.537	0.065	3.408
HCP mammogram referral	1.868	1.009, 3.458	0.047	3.956
Model 2: Enabling (n=152)				
Sociocultural deterrents	0.975	0.934, 1.018	.255	1.296
Model 3: Predisposing (n=150)				
Fatalism	0.927	0.757, 1.136	.466	0.532
Symptomatic Deterrents	0.919	0.833, 1.014	.093	2.820
Catastrophic Disease Expectations	1.004	0.883, 1.142	.953	0.004
Negative beliefs about HCPs	0.999	0.899, 1.109	.979	0.001
Length of US residence	1.022	0.984, 1.062	.262	1.257

AOR, adjusted odds ratio; CI, confidence interval; HCP, healthcare professionals

Research Question 2

What enabling factors, if any, were associated with mammogram adherence in Filipino American women?

Enabling Factor in the Population Domain

- Was there an association between insurance and mammogram adherence in Filipino American women?

Enabling Factor in the Vulnerable Domain

- Was there an association between sociocultural deterrents and mammogram adherence in Filipino American women?

Previous mammogram studies established evidence that health insurance is associated with mammogram adherence. Unfortunately, because this study's sample had only 3 women with no health insurance, this enabling variable was removed from the model. Table 14 shows that there was lack of evidence to establish that sociocultural deterrents were significantly associated with mammogram adherence (AOR=.975; 95% CI, 0.934-1.018; *p*-value=.255).

Research Question 3

What predisposing variables, if any, were associated with mammogram adherence in Filipino American women?

Predisposing Factor in the Population Domain

- Was there an association between cancer fatalism, symptomatic deterrents, catastrophic disease expectations, and negative attitudes about health professionals and mammogram adherence in Filipino American women?

Predisposing Factors in the Vulnerable Domain

- Was there an association between years of U.S. residence and mammogram adherence in Filipino American women?

In this sample of women, there was no evidence to establish that mammogram adherence was associated with cultural beliefs about breast cancer. Fatalism, symptomatic deterrents, catastrophic disease expectations, negative beliefs about healthcare professionals were not associated with mammogram adherence. The predisposing-vulnerable variable, years of U.S. residence, was not associated with mammogram adherence. The predisposing-vulnerable variable, nativity, was taken out of

logistic regression Model 3 because of cell frequency. There were only 5 women who were born in the U.S., 4 of whom were adherent with their screening mammograms and 1 who was non-adherent. Table 14 shows the Wald statistics for the variables in Model 1, Model 2 and Model 3.

Research Question 4

What was the association, if any, between need, enabling and predisposing factors and mammogram adherence among Filipino American women? In logistic regression model 4, all 8 independent variables were entered simultaneously. The Hosmer and Lemeshow test (*p*-value=.748) of the full model should be interpreted with the realization that only one variable was significant. Of the 8 variables, only mammogram referral from the healthcare provider was significant (*p*-value=.026). Thus, controlling for the other variables in the model, Filipino American women had 113% increased odds (AOR=2.133; 95% CI, 1.094, 4.160) of being mammogram adherent vs. non-adherent with each additional mammogram referral from a healthcare provider. Table 15 summarizes the adjusted odds ratio of these 8 variables.

Table 14

Full Model Logistic Regression Model for Mammogram Adherence (n=150)

		95% CI			Wald
	AOR	**LB**	**UB**	**p-value**	**statistic**
Need					
Breast cancer literacy score	1.207	.947	1.523	.131	2.278
HCP mammogram referral	2.133	1.094	4.160	.026	4.939
Enabling					
Sociocultural deterrents	.991	.942	1.042	.714	0.134
Predisposing					
Fatalism	.925	.747	1.146	.476	0.508
Symptomatic deterrents	.911	.824	1.009	.074	3.192
Catastrophic disease expectations	1.022	.895	1.167	.749	0.102
Negative beliefs about HCPs	1.004	.901	1.119	.941	0.005
Length of US residence	1.022	.982	1.063	.284	1.147

US, United States; AOR, adjusted odds ratio; CI, confidence interval; HCPs, healthcare professionals; LB, lower bound; UB, upper bound

A 2-tailed chi-square test (p=.001) revealed that mammogram adherence differed significantly among 3 groups of women - those Filipino American women who received no referral from their healthcare provider, those who received one referral and those who received 2 mammogram referrals. Table 15 shows the crosstabulation of number of mammogram referrals with mammogram adherence.

Table 15

Crosstabulation of Number of Mammogram Referrals (n=156)

	Number of Referrals			
	0	1	2	Total
Nonadherent	7	10	15	32
Adherent	4	54	66	124
Total	11	64	81	156

Examination of influence indicated that there were no influential cases (Cook's distance=.738, Leverage=.304). The highest DFBeta was 0.116 and this was for the number of times a healthcare professional gave a referral for a mammogram.

Prediction Accuracy

Prediction success rate for the non-adherent group was 9.7% and, 96.6% for the adherent group with an overall prediction success of 78.7%. Analysis of the Receiver Operator Curve (ROC) revealed an AUC of .721 (95% CI, .615-.826). Adjusting the cut-off score from 0.500 to .6348 decreased the false-positive from .903 to .645 but sensitivity was still at an acceptable level of .916. Re-running the full LR model with the new cut-off (.6348) improved the overall prediction success rate from 78.7 to 80% and the prediction rate for the non-adherent group also went up from 9.7 to 35.5% while maintaining the prediction success rate for the adherent group at 91.6%.

Summary

The purpose of this study was to determine the association, if any, between mammogram adherence and the need, enabling, and predisposing factors in Andersen's Behavioral Health Model. For each of the research questions, logistic regression models were analyzed. Model 1 sought to determine the association between mammogram

adherence and the need factors: breast cancer literacy and number of mammogram referrals by the healthcare professional. Model 2 sought to analyze mammogram adherence with enabling factors: health insurance and sociocultural deterrents. Model 2 had a lone independent variable, sociocultural deterrents. Model 3 sought to determine the association between mammogram adherence with the predisposing variables: fatalism, symptomatic deterrents, catastrophic disease expectations, negative beliefs about healthcare professionals and U.S. residence. On all 4 models, only one variable was significantly associated with mammogram adherence - the number of mammogram referrals by a healthcare provider. With each referral, a Filipino American woman had increased odds (2.13) of being mammogram adherent (vs. being non-adherent) controlling for other variables in the equation. This study underscores the important of the role of the healthcare provider in preventive cancer screening.

CHAPTER V

DISCUSSION

Main Findings

In this study's sample of 157 Filipino American women, the mammogram adherence rate was 79.6%, a few percentage points short of Health People 2020 goal of 81.1%. This is below the 81.5% adherence rate from a previous study using the most recent National Health Interview Survey data (White, et al., 2017). This study aimed to determine what factors influenced mammogram adherence among Filipino American women. Independent variables were chosen from the 3 factors in Andersen's Behavioral Model for the Utilization of Health Services for Vulnerable Population. These 3 factors were: need, enabling and predisposing. Of these 3 factors, 10 variables were identified as potentially associated with mammogram adherence. Logistic regression models were used to assess the association between mammogram adherence and need, enabling and predisposing variables. Of these variables, only mammogram referral (need-vulnerable factor) was found to be statistically significant and related to mammogram adherence. Enabling and predisposing variables were not significantly associated with mammogram adherence. Thus, the conceptual model for the study was only partially supported.

Mammogram Referral by a Healthcare Provider

Study findings are consistent with previous literature regarding the importance of the healthcare provider (HCP) in preventive health behaviors. An early study among low

income women provided evidence that a mammogram referral from a HCP was the most important determinant of mammogram adherence (Crane, Kaplan, Bastani & Scrimshaw, 1996). A more recent study on Latina women confirmed that a HCP's recommendation for a mammogram is significantly associated with mammogram adherence (Gonzales & Borrayo, 2011). The HCP's role in mammogram adherence has been operationalized through frequency of healthcare visits. Evidence has been established that infrequent contact with one's HCP is associated with low mammogram adherence (Goosens, et al., 2014) and that having a periodic health exam (wellness visit) was associated with a higher likelihood that the provider recommends a screening mammogram (Hoang, Hodgkin, Thomas, Ritter and Chilingerian, 2018). This present study adds validation to the body of literature that the healthcare provider role is critical in cancer screening in Filipino American women. The Healthy People 2020 goal is to increase the proportion of women who were counseled by their providers about mammograms from 69.8% to 76.8%. In this study, 92.9% received a mammogram referral. Of this group, 41.0% received one referral, 51.9% received 2 referrals.

Breast Cancer Literacy

This study contradicts previous research because in this group of Filipino American women, breast cancer literacy was high rather than prior report of low literacy among Filipino women. In a prior study with focus groups of Filipino physicians and Filipino women, one barrier to routine mammogram cited was lack of knowledge about the importance of cancer screening (Ho, Muraoka, Cuaresma, Guerrero, & Agbayani, 2010). Other mammogram studies done showed that Filipino American women lacked

understanding about screening modalities, insurance coverage, the importance of mammograms and screening guidelines (Wu & Bancroft, 2006; Wu, Hsieh & West, 2008 Ko, Sadler, Ryujin, & Dong, 2003).

In this study, there was no evidence that breast cancer literacy was significantly associated with mammogram adherence. This study's original email list had a subset of the author's professional network of colleagues in the healthcare field. Also, the women in this study had a higher educational level than most previous studies. The highly educated sample in this study reasonably explained their high breast cancer literacy. Thus, the high breast cancer literacy scores failed to distinguish mammogram adherent women vs. non-adherent women. An alternative explanation is that breast cancer literacy is not at all associated with mammogram adherence in this group of highly-educated women, it may very well be that other factors - such as social support or encouragement from a family member hold more influence.

Another plausible explanation as to why breast cancer literacy was not associated with mammogram adherence is the low reliability of the Breast Cancer Literacy Scale (BCLS). All 20 items of the BCLS had low and some items had negative point biserials. This failure to discriminate between the BCLS low scorers and high scorers could have led to a failure to discriminate mammogram-adherent Filipino American women vs. non-adherent women based on their literacy scores.

Finally, considering that the mean years of residence in the United States was 25.09 years, a possible explanation is that years of residence in the United States have led to this group of Filipino American women to be highly informed about mammograms,

screening guidelines and insurance payments for screening mammograms. A history effect would have been possible as the survey was launched in September when breast cancer awareness and pink ribbon campaigns heightened their appreciation of and served as reminders for screening. All these combined factors could explain why this sample of Filipino American women scored high in breast cancer literacy and why literacy was not significantly associated with mammogram adherence.

Sociocultural Deterrents

Sociocultural deterrents - e.g. having problems making an appointment, not knowing where to be screened, not having transportation, not being able to take time off from work – were not associated with mammogram adherence in this study. This contrasts with many previous studies. Prior reports indicate that Filipino American women had difficulty taking time off work to schedule a mammogram appointment and this was a barrier in mammogram adherence in these women (Wu & Bancroft, 2006; Ho, Muraoka, Cuaresma, Guerrero & Agbayani, 2010; Wu, Hsieh & West, 2008). Competing family obligations took precedence over scheduling mammogram appointments (Burke, Bird, Clark, Rakowski, Guerra, Barker & Pasick, 2009) seen in previous studies was not associated with mammogram adherence in this study. Navigation issues negatively influencing mammogram adherence seen in previous studies (Ho, Muraoka, Cuaresma, Guerrero & Agbayani, 2010; Burke, Bird, Clark, Rakowski, Guerra, Barker & Pasick, 2009) were not validated in this study. This could be explained by the demographics of women in this study who had been residing in the United States for quite several years - they already know their way around and more importantly, can drive themselves to

mammogram facilities. Professional colleagues of the author in the healthcare field – doctors and nurses – also formed a subset of this sample. Thus, both the length of residence and being in the healthcare field could explain why sociocultural deterrents were not significantly associated with mammogram adherence for the Filipino American women in this study.

Cultural Beliefs

Cultural beliefs about cancer and cancer screening - such as fatalism, symptomatic deterrents, catastrophic disease expectations, and negative beliefs about healthcare professionals - were not associated with mammogram adherence. The mean scores of this sample were such that these Filipino American women were not fatalistic, did not let lack of symptoms deter them from going for a mammogram, did not view breast cancer as a catastrophic disease or did not have extremely negative views about healthcare professionals. The CCSS scores did not significantly differ between those who were mammogram adherent versus those who were not adherent. This could be explained by the fact that the Filipino American women in this study were highly educated and employed. These two social determinants of health are often equated with acculturation. Acculturation to Western health beliefs could additionally be explained by the years of residence in the United States of the Filipino American women.

Nativity and Years of U.S. Residence

There was no evidence in this study that years of residence in the United State was associated with mammogram adherence. This is consistent with another study on Asian American women where length of stay in the United States was significantly

associated with mammogram adherence but became insignificant when health insurance and having a regular physician were factored into the analysis (Lee, Chen, Jung, Baesconde-Garbanati & Juon, 2014).

Limitations

A number of caveats need to be noted regarding this study. Some limitations of this study were inherent to the administration of the survey. Filipino American women had to have access to the internet and had to be computer literate to take the survey. The survey was in English and so Filipino American women with lower English proficiency and those women who were not computer literate may not have been effectively recruited. Selection bias cannot totally be ruled out in that mammogram-adherent women would have been more inclined to complete the survey.

Another limitation of this study was the lack of heterogeneity of the sample. This study was unable to consider the effect of health insurance and nativity on mammogram adherence. An overwhelming majority of this highly educated group had health insurance. The homogeneity of this sample therefore limits the generalizability of the findings.

The responses to the question of mammogram adherence was taken through self-report and was therefore subject to recall bias. One study shows that there is a concordance of 82% between self-report of mammography and database health records; but only a 58% concordance when comparing the date of last mammogram and the health records database (Thompson, Taylor, Goldberg & Mullen M., 1999). Nonetheless, a recent study provides evidence to warrant the use of self-reported mammogram as valid

(Nandy, Menon, Szalacha, Park, Lee & Lee, 2016). Another limitation in the operationalization of mammogram adherence is that the non-adherent group was collapsed from 2 distinct groups - Filipino American women who never had a mammogram and those whose mammogram was more than 2 years prior. It could very well be that variations between these 2 group of women were distinct enough to warrant that these groups be disaggregated.

Convenience sampling was another limitation. Also, because snowballing sampling was utilized, response rate could not be calculated. What is known is that there were 84 women in the original list of email addresses used for recruitment and a total of 190 respondents opened the link and 182 persons went past the informed consent. The factors for not completing the survey are unknown.

Strengths

Previous studies have investigated the relationship between breast cancer literacy and mammogram use. In some of these studies, literacy was operationalized through self-report (Burke, Bird, Clark, Rakowski, Guerra, Barker & Pasick, 2009). This is one of the first, it not the first study, that comprehensively appraised Filipino American women's knowledge breast cancer and mammogram screening guidelines with 20 items of Breast Cancer Literacy Scale. Based on the Breast Cancer Literacy Scale scores, Filipino American women are knowledgeable about breast cancer and screening guidelines. Also, this was the first study that utilized the Cultural Cancer Screening Scale on Filipino American women and that used the scale to determine if an association exists between their cultural beliefs and mammogram adherence.

This study updates a similar mammogram adherence study that utilized Andersen's Behavioral Model's need, enabling and predisposing factors to determine their association with mammogram adherence among Filipino American women (Miller & Champion, 1993). This current study updates and amplifies the 1993 study by using the expanded version of Andersen's Behavioral Health Model which includes variables that are unique to a vulnerable group such as the Filipino American women.

Previous mammogram studies on Filipino American women were geographically limited. The women in this study were from 22 states, a wider distribution than previous studies. The top states were California (n=47, 29.9%), North Carolina (n=14, 8.9%), Pennsylvania (n=13, 8.3%), New Jersey (n=12, 7.6%), Texas (n=12, .6%) and Virginia (n=10, 6.4%). Appendix B summarizes the distribution of women among states.

Implications for Policy, Education and Research

This study provided evidence that Filipino American women seem to be knowledgeable about breast cancer and mammogram guidelines with a mean score of 16.45 for the non-adherent and 17.10 for the mammogram-adherent women. What this study shows though is that some women do not know that, with the implementation of the Affordable Care Act, mammogram adherence is offered at no-cost for women with health insurance. Eleven percent (11%) got this question wrong: The Affordable Care Act requires mammography screenings to be covered by all new health insurance policies. In addition, of the 9 women who had never had a mammogram, 4 of them responded to the question, do you have health insurance: Yes, I have health insurance but I do not know if it covers a screening mammogram. This study provides evidence that Filipino American

women need to be informed that health insurance covers the full cost of screening mammogram for age-eligible women. Another important teaching point is to direct Filipino American women to do self-referrals for a mammogram. That is, to let them know that they do not need a referral from their healthcare provider to go for a screening mammogram. Future research may need to focus on Filipino American women who do not share this sample's socioeconomic advantages.

This study provided evidence that the mammogram referrals by a healthcare provider was most determinative of mammogram adherence. This study provides a rationale for the Healthy People 2020 goal of increasing the number of women who are being referred for mammograms by their healthcare providers. Of the 11 Filipino American women who had zero mammogram referrals, 7 were non-adherent. Of the 9 women who had never had a mammogram, 4 of these women had zero referrals. A wellness visit (annual physical) with a healthcare provider is an opportunity for the healthcare provider to make a mammogram referral. Future research may need to study the impact of having an annual wellness visit on mammogram uptake, or for that matter, simply having a primary care provider. Another point of contact that provides an opportune time for a mammogram referral is during discharge instructions. Prior to a discharge from a medical care facility, the nurse instructs the patient on his medication, diet and follow-up appointment with a provider. A good policy for systems change would be for nurses to provide mammogram referrals for all age-eligible women during discharge instructions.

In this study's sample of Filipino American women, despite being highly educated, despite having high breast cancer literacy, these women had a mammogram adherence rate (79.6%) that was a few percentage points below the HP2020 goal of 81.1%. The findings of this study crystallized the one thing that is most determinative of mammogram adherence: a mammogram referral from a healthcare professional. Future research may need to focus on reinforcing the healthcare providers about the Healthy People 2020 goal of increasing the number of their mammogram referrals by monitoring or possibly incentivizing mammogram referrals with a health grade score or setting a benchmark.

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APPENDIX A

BREAST CANCER LITERACY SCALE WITH CODING
(1=CORRECT, 0=INCORRECT)

Mammography

1) A mammogram is an x-ray of the breast that looks for changes that may be signs of breast cancer.
True=1
False=0
Reference: American Cancer Society (2018), p. 18

2) Mammogram is an effective method of detecting breast cancer at the earliest stage.
True=1
False=0
Reference: American Cancer Society (2018), p. 2

3) Mammograms are not perfect in that they can miss some cancers.
True=1
False=0
Reference: American Cancer Society (2018), p. 19

4) A woman has the option to begin screening for breast cancer at age 40.
True=1
False=0
Reference: American Cancer Society (2015), p. 18

5) A woman without a family history of breast cancer should get her first mammogram at age.
40=1 45=1 50=1 55=0
Reference: American Cancer Society (2018), p. 18; U.S. Preventive Services Task Force (2016)

6) For women >55 years old, a mammogram should be done:
Every year=0
Every 2 years=1
Reference: American Cancer Society (2018), p. 18;

7) If a woman has breast implants, she can no longer go for mammograms.
True=0
False=1
Reference: American Cancer Society (2018), p. 17

8) The benefits of mammography outweigh any possible harm from the radiation Exposure.
True=1
False=0
Reference: American Cancer Society, (n.d).

9) If you do not feel pain or a lump in your breast, then you do not have to go for a mammogram.
True=0
False=1
Reference: American Cancer Society (2018), p. 3

Breast cancer

10) Most women who develop breast cancer do not have a family history of breast cancer.
True=1
False=0
Reference: American Cancer Society (2018), p. 11

11) The Affordable Care Act requires mammography screenings to be covered in all new health insurance plans without cost sharing.
True=1
False=0
Reference: American Cancer Society (2015), p. 19

12) If a woman finds a lump in her breast, it is most likely breast cancer.
True=0
False=1
Reference: American Cancer Society (2015), p. 1

13) The earlier stage that breast cancer is discovered, the better the survival.
True=1
False=0
Reference: American Cancer Society (2015), 2015, p. 1

14) Trauma or mechanical injury to the breast can cause breast cancer.
True=0
False=1
Reference: Dana-Farber/Harvard Cancer Center (n.d.)

15) The earlier stage that breast cancer is discovered the better the survival.
True=1
False=0
Reference: American Cancer Society (n.d.)

16) Men can be diagnosed with breast cancer.
True=1
False =0
Reference: American Cancer Society (2018), p. 11

17) Excluding skin cancer, breast cancer is the most commonly diagnosed cancer in women of all races.
True=1
False=0
Reference: American Cancer Society (2018), p. 18

18) When the tumor is small, breast cancer typically has no symptoms.

True=1
False=0
Reference: American Cancer Society (2018), p. 2

19) A cancerous tumor in the breast is usually painful.
True=0
False=1
Reference: American Cancer Society (2018), p. 2

20) Breast cancer risk increases with age.
True=1
False=0
Reference: American Cancer Society (2018), p. 11

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APPENDIX B

GEOGRAPHICAL DISTRIBUTION OF RESPONDENTS

	State	Respondents	
		N	%
1.	California	47	29.9
2.	North Carolina	14	8.9
3.	Pennsylvania	13	8.3
4.	New Jersey	12	7.6
5.	Texas	12	7.6
6.	Virginia	10	6.4
7.	New York	9	5.7
8.	South Carolina	7	4.5
9.	Maryland	5	3.2
10.	Nevada	4	2.5
11.	Florida	4	2.5
12.	Connecticut	3	1.9
13.	Arkansas	2	1.3
14.	Arizona	1	0.6
15.	Delaware	1	0.6
16.	Hawaii	1	0.6
17.	Illinois	1	0.6
18.	Missouri	1	0.6
19.	Rhode Island	1	0.6
20.	Tennessee	1	0.6
21.	Washington	1	0.6
22.	Wisconsin	1	0.6
	Missing Data	6	3.8
	Total	157	100